EDITORIAL

A GERMAN peace offensive means an offensive peace, nothing else.

THE office boy says it's bunk having a girl who is afraid of the influenza.

THERE isn't enough left of the Hindenburg line to hang a suit of B. V. D.'S on.

THE Spanish 'flu', and the Germans flee; every day they attain their objectives, further in the rear.

SPANISH INFLUENZA is said to start with a cold in the head, punctuated with sneezes. Is it possible that we have been blaming a new disease for what may be only due to an attempt to pronounce the names of towns on the Balkan front?

"YOU are there. Stay there," were the instructions of an American general to his men, who had taken a strong German position and were facing counter attack. This isn't bad advice for the men who have started a metal trades industry in the West either.

THE man who quits his job; the man who slacks in his work; the man who spends his work hours trying to scheme for more holidays is worth more to the Kaiser now than a whole company of infantry.

IF the old story 'We can't compete', has been wiped out of the minds of the men engaged in the Western metal trades by their war-time accomplishments, we may add one more to the lessons taught us by the Hun.

"THE greatest ship-builder in the world" may sound like a large contract, but only those who know the condition of the Union Iron Works plant after the earthquake and fire of 1906 can really gauge the magnitude of Joseph J. Tynan's accomplishment.

THE American Federation of Labor has its faults, but when it announces that "No strike should be inaugurated that cannot be justified to the man risking his life on the firing-line in France," no one can object to the complementary proposition that "Employers should inaugurate no industrial policy that cannot be justified to the man risking his life on the firing-line."

DURING July and August, 616,779 dead-weight tons of shipping was completed and delivered to the Emergency Fleet Corporation. Since the beginning of the War, submarines have sunk 541,925 tons of American shipping. These figures do not take into account the losses of other countries, which must, in the aggregate, have been considerably greater, but they indicate how the American shipbuilder is helping to win the War.

ENGINEERS and others that have had experience in boiler-plant operation are needed for volunteer service in California under the Federal Fuel Administration. The Fuel Administration wants a representative in each county to devote a few hours a week to visiting boiler-plants and giving advice regarding methods of saving fuel. Expenses will be paid, but the Fuel Administration's funds are insufficient to compensate a man for time spent in this work. Here is a chance to do some real war work. Qualified persons should apply to J. M. Wadsworth, 725 First National Bank Bdg., San Francisco.

THE reluctance of the German people to subscribe for their Ninth War Loan in view of the falling market for these securities reminds us of the negro barber in the well-known anecdote. He was a 'free nigger' with his own shop in Washington in 1861. For several years he had been saving money to buy his mother and sister out of slavery in Virginia, which fact was known to many of his white patrons. Soon after Lincoln's first inauguration, while talking to a patron whose tips had been particularly liberal, he mentioned the amount he had in the bank. "I suppose, Rastus, that you will soon be buying your mother and sister out of slavery," said his white friend. "Ah dunno, boss," said Rastus. "Ah've an idea that niggers is going to be mighty cheap before this war's over."

WHEN a strong organization goes up against a weak organization, which wins? The answer is obvious. When the unorganized so-called general public tries to put a piece of legislation through that organized labor does not approve of, what happens? General public achieves its objectives, in the rear. Whenever there is a wage controversy, the more or less unorganized employer always loses. More organization on the one hand, and the lack of it on the other tells the tale. The labor organizations are organized to fight, and conduct a vigorous offensive at all times along these lines. No one ever won a battle through conducting his fight on defensive lines, and never will. Take off your hat to the unions; they know what they want, they are organized, they are go-getters. The moral of this is that if you want something, and want it badly enough to fight for it, organize and get busy. This applies to World Wars, trade wars, and every other contest that takes place in this complicated fight for existence.

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Liberty Loan Over-Subscribed

In spite of hell and high water, Spanish influenza and German propaganda, the Fourth Liberty Loan has been over-subscribed. Six billion is a lot of anything, particularly when it is six billion dollars, but it was needed for the winning of the War, and that was enough for the American people. The over-subscription is at once the best possible answer to the fake peace terms proposed by the camouflaged Potsdam gang, and the best possible backing to the boys that are doing such splendid work on the firing-line in France and Belgium. As usual in Loan and other drives, the question has not been whether the San Francisco Bay district and the rest of California would go 'Over the Top', but how far over they would go.

Combined Societies Drive

Last month we all took advantage of the opportunity to perform a patriotic duty and at the same time to invest in the best security in the world. During November we will have an equally good investment offered to us, but one whose returns will be paid in increased morale of our fighting men rather than in cash. There are seven organizations included in this combined drive, among them being the Young Men's Christian Association, the Young Women's Christian Association, and the Knights of Columbus. We know that every one of these organizations is doing an important and an indispensable work in furthering the mental, moral, and physical well-being of either the men in the training camps, on the high seas, and on the firing-line, or of the women that are taking positions so as to release men for that same firing-line. The country's quota is $170,500,000. Let us see that it is over-subscribed.

War as a Teacher of Geography

Who knew where Chateau Thierry was four years ago, or Ypres, or St. Mihiel? Who knew whether the Somme or the Aisne were French liqueurs or contagious diseases? Now everybody has at least an intelligent conception of the Ukraine; we discuss the reclamation of Palestine from the Turk; the feats of the British in Mesopotamia evoke our enthusiastic admiration. Then there are our friends, the Czecho-Slovaks, whatever you may call them when you try to pronounce the name. There is a fearful and wonderful Anglo-Saxon version of French and Belgian proper names, to say nothing of the jaw-cracking attempts to solve the mysteries of the polyglot tongues of Austro-Hungary. Ypres becomes Wipers in the mouths of the British Tommies. Ploegsteert is Plugstreet, Fismes is Fizzums, while poor Soissons is maltreated more than any of them. St. Quentin is not difficult for Californians, although the Spanish twist is quite different from the French version. The French scholar turns up his nose in erudite scorn at the, to him, absurd struggles of his less gifted brother, while, at the same time, he, himself, guilty of the obvious inconsistency of calling Paris 'Paris' instead of 'Paree.' However, one thing seems fairly certain, and that is: 'Feem' or 'Fizzums,' 'Eep' or 'Wipers,' the Tommies and Yanks seem to find their way to these queer sounding places without difficulty, and having found them, to proceed to that section of the European continent where German is spoken, and American will soon be understood.

Retroactive Wage Scales

Since it never rains but it pours, the metal trades are busy as the proverbial bird-dog dodging the sundry and various brickbats that come from every direction. The latest is the retroactive wage award, which, like the good rule, works both ways. The finished job is far from completed just because the work has been delivered. On the contrary, as far as the cost is concerned, it has just commenced. The manufacturer makes up an estimate, puts in his bid, gets the job, finishes it, and gets his money. Then the next thing he knows, along comes some wage commission or other and increases wages and makes the increase retroactive back over a period of months covering the jobs for which bids have been made, and which bids must be observed. The result is that the manufacturer's profit goes glimmering, in fact, he is lucky if the retroactive increase does not put him far in the hole. Since this condition apparently must be met, there would appear but one thing to do, and that is to protect all bids and contracts with a clause specifying the wage and material conditions under which the estimates were made, and providing for a revision of prices in accordance with any changes that may occur during the time of manufacture. The obvious justice of such a protection for the manufacturer should militate in favor of its ready adoption, whether the purchaser is a mere private corporation or our Uncle Samuel himself.

The Slicker

There is a new brand of camouflaged patriot called a slicker. The slicker, as ordinarily constituted, is a man within the age requirements for service with troops at the front, who, by hook or crook, obtains a commission in some army staff corps, and then an assignment to duty in some department at Washington, where, in horseless boots and tailor-made uniform, he furnishes the military atmosphere at dances, teas, and receptions. He braves the attacks of germs from dusty typewriters; he never leaves the dinner table until the last of the *hors d'oeuvres* have succumbed to his impetuous onslaught. An officer of the line snorts with disgust at this type of draft dodger, and with good reason. There are many technical experts that have undertaken army staff work with the most patriotic motives, and are really doing their bit to win the War, but the real simon-pure

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slicker cannot be mistaken for anything else. Now that men qualified for limited service are being inducted into army clerkships, and men up to forty-five are registered, it begins to look as if a general house-cleaning were in prospect whereby the highly decorative knights of the pen and typewriter will be amputated from their swivel chairs and sent over-seas, leaving their places to be filled by men whose qualifications are mental rather than physical.

Trust Busting

It isn't so very long ago that great aggregations of capital were being slammed all over the lot. The Sherman anti-trust act, the Interstate Commerce Commission, and dozens of odds and ends of State laws all seemed to assume that any enterprise was wickedly bad if it was large, and chemically pure if it was small. The process of splitting up a lot of resultant 'trusts' into their original components was the conventional pastime for the lawyers, when War came along and knocked the whole thing into a cocked hat. Lo and behold, it was discovered that the real efficiency in meeting all of the transportation problems that descended upon us almost overnight could not be obtained in any way other than through the self-same gigantic combinations which we had been trying to 'bust.' Since the laws couldn't be broken, the Government promptly took over the transportation lines and the industries of the country and proceeded to weld them all into a 'trust' so all-embracing as to outdo any of the feeble efforts of Rockefeller, Morgan, and Harriman, even in their palmiest days. Every man, whatever his personal status in the world of business or finance, found himself enlisted in the great Cause in some capacity, and, every man has done his bit, and will continue to do his bit until the Hun has been reduced to impotency and the world is safe for democracy. But, speaking of democracy, why not make the world reasonably safe for business, also? Certainly, there could be no greater object lesson than the feats of American industry during the past eighteen months. Why should all the organization, system, and efficiency that have been developed under the stress of the necessities of War be discarded for a return to the legal bickerings and harassings that were under way before Armageddon? There must be some more constructive way to work it out than the destruction of the whole industrial fabric of the Nation. The industries of the United States should never again become a political football for aspiring candidates for office.

What Will Become of the Ships?

It may have taken a little time to get started, but there is no denying the fact that the ship-building program of the United States has astonished the world. It begins to look as if there would be nearly 15,000,000 tons of American bottoms available within less than two years, as compared to about one-tenth that amount when work began in real earnest. What are they going to carry when the War is over? Figures are not available as to the exact tonnage destroyed by the U-boats, but it is only recently that the curve of production crossed that of destruction. There is still a great loss to be replaced before the world's shipping will have reached the point of total tonnage in existence at the outbreak of war. Even assuming that the total tonnage of the world will be double that of four years ago, the impetus to industry will make the American manufactured article known in markets where it has been a total stranger in the past. The metal trades of the West will not quit when the War demand ceases. Smelting of Californian iron ores with Alaskan coal and Californian hydro-electric power is within the bounds of possibility, even probability. There is even a chance that economic independence may be achieved by the Western States, so far as manufactured products of iron, steel, and brass are concerned, and why not? We have the men, the equipment, and the raw materials. All that is needed is a little push, initiative, or whatever you may call it, to place the West on the manufacturing map to stay.

Influenza, 'Gas Masks', Democracy

From our office-window one can look across the street and see American girls wearing something resembling the veil used in Turkish harems, only here it is required of both sexes. On the street, old friends pass each other without a sign of recognition. In the evening, to be approached by a masked stranger, who wishes to ask some simple question, is a nerve-racking experience. Seriously, however, is not the cheerful and voluntary compliance by nearly all the people with all sorts of inconvenient regulations a sign that we are working toward that seeming paradox, an efficient democracy? The need arises to send meat and wheat to our Allies, and the whole Nation sets itself to save these commodities. Later the same thing happens with sugar. Our friends on the other side of the Mississippi gave up Sunday joy-riding for several weeks. Now comes the influenza, and a large majority of the people retire, without much grumbling, behind an uncomfortable mask. There is little or no compulsion with any of these regulations, and there have been few attempts to punish the individual violator. Yet they have been observed as well or better than was the case with most laws in the good old days before the War. There was a time when breaking a law was the only thing that was easier than making one. Times have changed, and the underlying cause of the change is that the people see far enough ahead to recognize that these regulations, inconvenient as they are at the time, are for their own good in the long run. Perhaps while we are making the world safe for democracy, we are also progressing in the direction of making democracy safe for the world. And this latter job is, if anything, the more important of the two.

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Paper Profits

The new revenue bill to provide $8,000,000,000 has passed the House and is before the Senate. It is doubtful whether any modification of consequence will be made in the original House draft. The American business man is facing large increases in the business profits taxes, and it is not at all too soon to make provision for meeting the extraordinary demands upon his resources. Paper profits are one thing; available cash is another. Most manufacturers, especially those engaged in the metal trades, have been called upon to pay 100, 200, and in some cases even 300% higher prices for materials than during the pre-war period. These stocks are invoiced at cost, and, as a rule every cent of cash surplus is immediately re-invested in betterments, plant extensions, and Liberty Bonds. It will probably be the rule, rather than the exception, for the manufacturer to be compelled to borrow the money with which to pay his taxes next year. Without being unduly optimistic, it seems at least reasonable to assume that final victory for Allied arms is not far distant and that 1919 will see the end of the War. With peace will come a cessation of war demand for the products of American factories, and a consequent shrinkage in the market value of metal products now inventoried at war prices. This shrinkage will wipe out a large proportion of the profits, paper profits, that look so well on the balance sheet but are not sufficiently liquid for either dividend or tax-paying purposes. The National City Bank of New York in its October circular calls attention to this condition, and suggests that bankers are aware of the doubtful character of the profits in sight and have no inclination to discount them. It is to be hoped that the Senate will take this situation into consideration in dealing with the taxation of business profits, and give business a reasonably fair chance to avoid financial wreck when the inevitable period of readjustment begins.

Re-educating Disabled Soldiers

In another column appears an account of the investigations made by the Red Cross Institute for Crippled and Disabled Men regarding opportunities for employment for such men, particularly in the metal industries. An encouraging feature about the public attitude toward the War and its attendant problems has been the way each of these problems has been faced and studied. 'Begging the question' has gone out of style. Nowhere is the contrast with former wars more noticeable than in the case of the crippled veteran. Formerly he was either starved or pauperized, usually both by turns. The exceptional man rose above all handicaps and established himself on an equality with his able-bodied contemporaries. The exceptional man can do that, and there is no need to consider him. But the average crippled soldier needs a little intelligent co-operation before he can get back to self-support and a life useful both to himself and the community. Probably the most serious difficulty will be that in the first few years after the War, everyone will be anxious to 'do something for the soldier.' The crippled man will be handicapped, not by his injury, but by the knowledge that he will not be 'fired' even if he fails really to learn his new trade and become a capable workman. Then when competition grows stronger and the War fades into the distance, the employer will be tempted to get an able-bodied man. That the cripple can make a capable workman if given the proper incentive is shown by the fact that 20% of the employees of the Ford Company are either cripples or otherwise 'below par,' and that a large majority of these men are reported by their foremen to be as efficient as able-bodied men. What Mr. Ford can do, other manufacturers can also do. In fact they will have to, because the supply of able-bodied workmen, even after the War, is not going to be equal to the demand.

The Macy Award

After several months delay, the award of the Wage Adjustment Board of the U. S. Shipping Board has been handed down, and although it is probably not as satisfactory as either affected party hoped, neither is it as unsatisfactory as they feared. The principal feature of the award is a wage increase of approximately twenty per cent over the last award of the Board, the new basic wage being fixed at 80 cents per hour for the principal skilled crafts. The actual increase over the present rate is about ten per cent, as a ten per cent raise was granted by the employers on August 1.

The report states that the increase is based upon the increase in the cost of living from October 1, 1917, to October 1, 1918, which is said to be 20%. This is open to argument, as other figures do not show anything like so large an increase in this district. It is stated in the award that the wage increase will automatically increase the cost of living, and that, of course, will justify another wage increase, and so it will go around a merry spiral with wages and cost of living chasing each other upward. In April and October the Board will meet to consider revision of wages.

A most unfortunate part of the award to the industries other than shipyards is the retroactive feature which makes the raise effective August first. Uncle Sam will pay the retroactive increase for the shipyards but not for the other industries affected by the award. With these, the retroactive increase will be a total loss. Jobs have been taken, completed, and paid for on a basis of the prevailing wage, and to saddle these firms with this retroactive increase that will in many cases wipe out all profit is not just and equitable.

At this writing it is hard to determine what course will be taken by the two parties concerned regarding the acceptance of the award, but the fact that both parties appear to be about equally dissatisfied would indicate that the award, in most of its features, follows the middle course and will therefore be accepted.

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Quantity Production of Engines at the Skandia Pacific Plant

By
GEO. N. SOMERVILLE

FORGING CRANK-SHAFT FOR

SIX-CYLINDER 500-HP. ENGINE

LARGE orders for one type of engine have made it possible for this California company to make special studies of all the operations of manufacture. The result has been increased efficiency and reduced cost. A particularly interesting feature is the use of the oxy-hydrogen torch instead of drilling for removing the material from crank-webs. Mr. Somerville, author of this article, is head of the company's engineering department.

THE Skandia Pacific Oil Engine Co. recently received a sufficient number of orders for its 120-hp. semi-Diesel two-cylinder marine engines to permit construction of 60 machines at once. The size of this order made possible a considerable saving in machine operations by a moderate investment in tools and jigs. Some of these operations, as well as several operations on other sizes of engines, are described below.

The main bearing-liners in Skandia engines are cast-iron shells split on the centre line, with poured babbitt-lining. They are bored, faced on both ends, and turned on the outside to facilitate rolling out the bearings without removing the crank-shaft. This particular detail offered an opportunity for a simple, yet effective tooling. The castings as received from the foundry are first sent to the heat-treating department, which is equipped with the necessary melting-pots and holding-fixtures for this operation. The first machine operation on main-bearing liners, as shown in Fig. 1, consists of milling the faces of the bearing halves on a Potter and Johnson duplex-table automatic milling-machine. This operation is continuous, the castings being held in the regulation V-block fixture. This machine is semi-automatic in its operation. The two tables are mounted equidistant from the centre line of a vertical spindle around which they revolve, and the driving mechanism is so arranged that only the table under the milling-cutter is provided with lateral movement. In this way the operator can load and charge the holding-fixture of the idle table while the machine performs its functions on the parts held on the operating table. By this method production can be greatly increased as compared with a standard milling-machine, because of the elimination of the lost time in unloading and charging the fixtures, a considerable item when large numbers of duplicate parts are to be handled.

From the milling-machine the bearings are passed to a Steinle turret-lathe. Here they are held by means of a special fixture for boring out and facing one end. The rough castings are provided with small lugs on the parting-line, which are machined flush in the previous milling operation. These small lugs appear on half of the castings only, or the first part assembled in the Steinle fixture. These lugs rest on machined ledges within the fixture and locate the parting-surface on the centre line

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of the lathe-spindle. The second half (without lugs) is then put in the jigs, and both halves are clamped together by means of set-screws bearing against the rough outer surface of the liners. The cross-feed tool-post is provided with both a roughing and a finishing tool, either of which can be thrown into position and the stops set for predetermining their location. The facing on the exposed end of the liner is thus accomplished by means of cross-feed tools. The boring is done by means of a piloted Davis micrometer adjustable boring-tool. These bars are of the 2-point variety with removable cutters. The operation is performed in two cuts, a roughing and a finishing cut. In the turret-lathe department there are eight Steinle lathes, all duplicates, and a complete set of Davis boring-bars with micrometer adjustment, which gives a boring capacity from two to ten inches. This operation is shown in Fig. 2.

The second turret-lathe operation consists of turning the outside of the liners and facing the other end. This is usually done by the adjoining turret-lathe. Both machines are set so that the second machine is working about a day behind the first. A special fixture is provided as shown in Fig. 3 and 4, bolted to the face-plate of the Steinle lathe and extended in such a way that it forms a mandrel the same size as the engine-journal, the outer end being supported in the tail-stock centre. Both halves are mounted on this mandrel-fixture and clamped in place by means of the clamp-strap and bolts shown in Fig. 3. The cross-feed tools turn and face the outside diameter between the locating shoulders, which have to be extremely accurate. This is easily accomplished by means of the micrometer adjustment provided on the machines. After turning and facing the outside diameter, the cross-feed tool-post is revolved and a new cutter is brought into play for facing the second end of the bearing. In this case a hinged clamping-ring is provided to hold the two halves together and in their proper relation, the clamping-straps having been removed to avoid interference with the cross-feed tools. Fig. 4 shows the clamping-strap in place when facing off the last end of the liners. In practice the strap is first clamped over the liners before the straps and bolts on the ends of the liners are removed. In this way the position of the work is not disturbed and the time for making the change is reduced to a minimum.

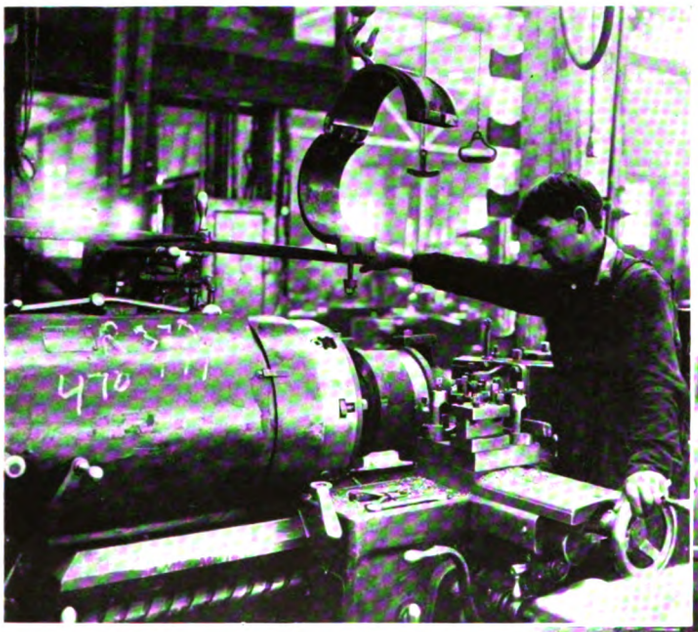

FIG. 3. TURNING MAIN BEARING LINERS AND FACING BETWEEN LOCATING SHOULDERS, SHOWING FIXTURE WITH CLAMP-STRAPS AND BOLTS, ALSO HINGED CLAMP-RING.

The above operations are representative of the methods used on all similar work by the company. The advantage of careful tool study wherever the quantity of work to be handled will permit has been clearly demonstrated.

Piston-rings are manufactured in large numbers. The 120-hp. engine is a two-cylinder engine. Each piston is provided with seven rings approximately 14⅛ in. diam. and ¼ in. wide. The rings are of the eccentric variety, cut on a 45° angle. In addition to the cut on the thin side, a semi-circular notch is provided at the cut, this notch being arranged to fit over a stop-pin in the piston, which is utilized for preventing the piston-ring from turning in the piston-ring groove. It will be remembered that the Skandia engine is two-cycle. Movement of the piston rings must therefore be prevented in order that the ends may not become expanded into the ports in the cylinder-walls.

Fig. 5 shows the first operation in the manufacture of piston-rings on a Bullard vertical turret-lathe. The holding-fixture for this operation consists of two plates covering the whole surface of the mill-table. The lower plate is fastened by means of the head bolts to the mill-table. On its

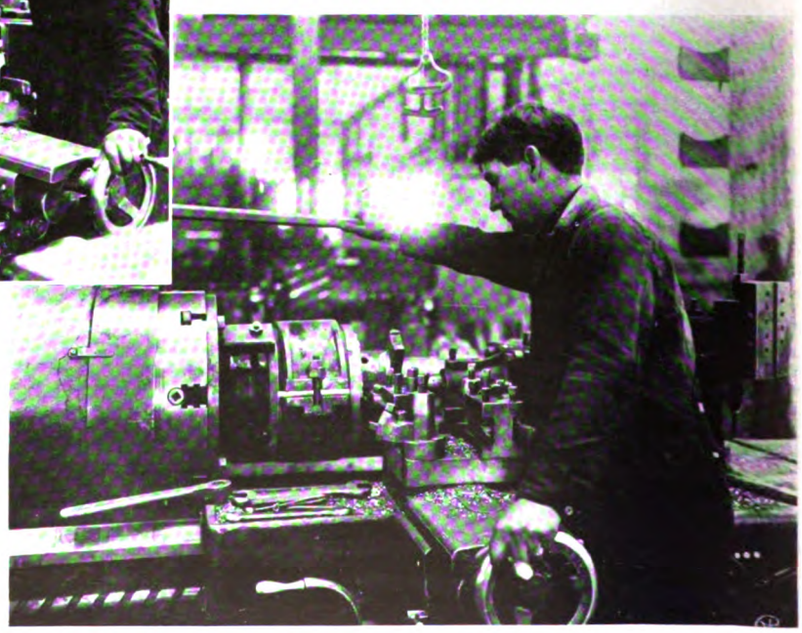

FIG. 4. FACING END OF LINERS, SHOWING HINGED CLAMP-RING IN PLACE

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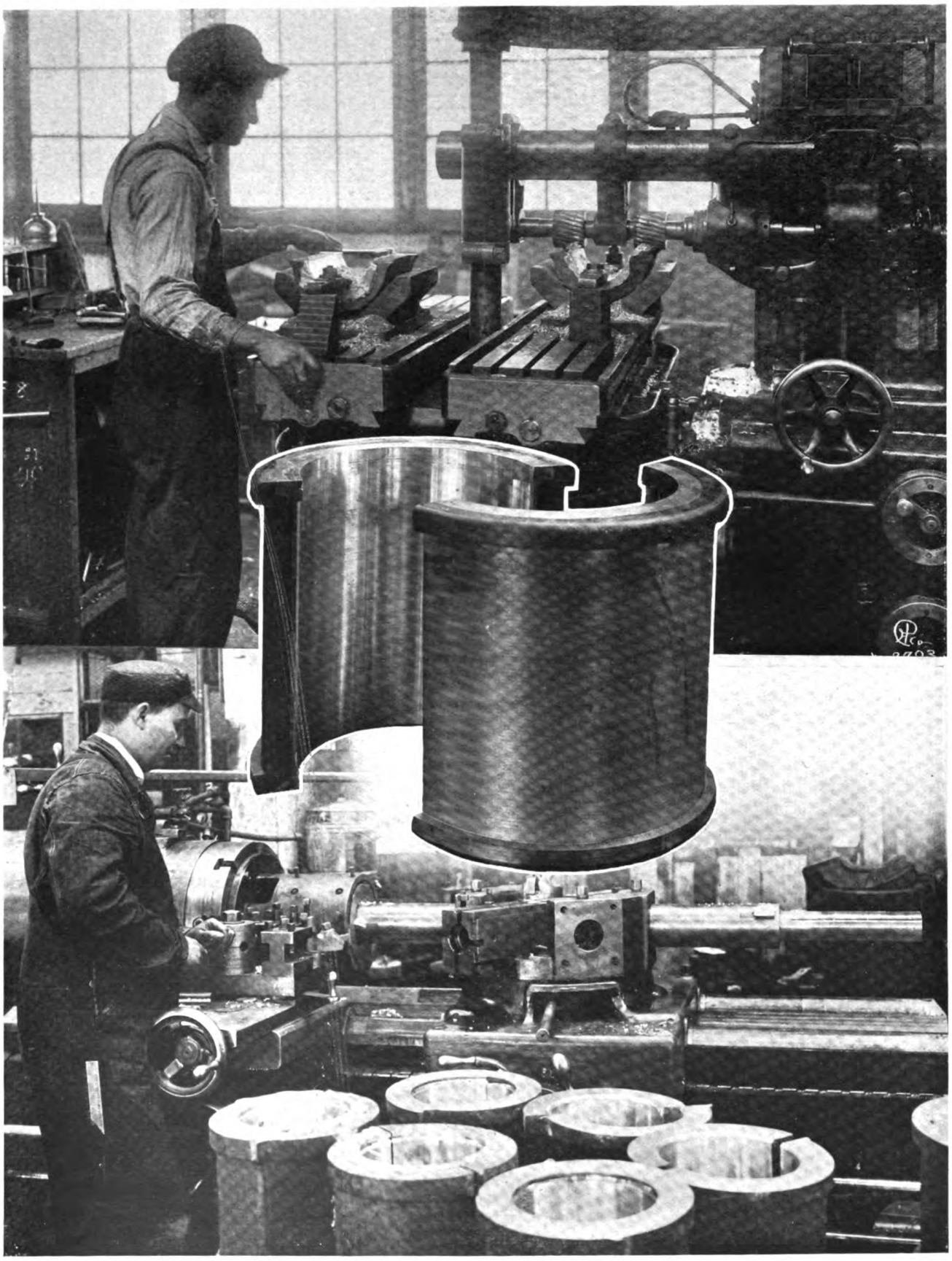

FIG. 1 AND 2. MILLING MAIN-BEARING LINERS. BORING AND FACING MAIN-BEARING LINERS IN TURRET LATHE. CENTRE—COMPLETED LINERS

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centre is machined an eccentric pin. The pin is made removable, so that pins of different eccentricity can be provided to take care of different rings. The second plate, which is mounted on the first or lower plate, is machined to fit accurately over the eccentric pin. The

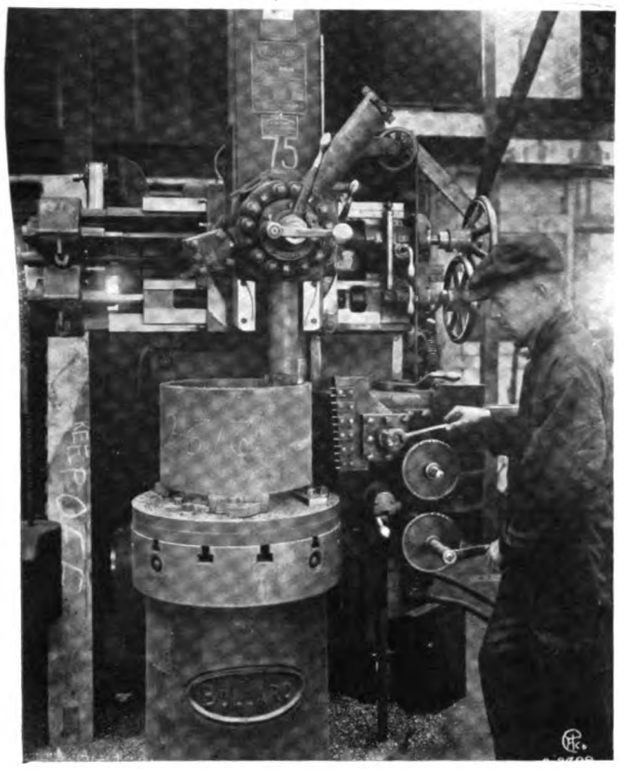

FIG. 5. BORING PISTON-RINGS, SHOWING GANG CUT-OFF TOOLS AND DOUBLE-HOLDING FIXTURE

rotation of the top-plate through 180° gives the necessary shift or eccentricity to the ring. The top-plate is provided with slotted holes to allow the clamping-bolts that fasten it to the lower plate to have the proper movement for the two positions. The piston-rings are cast in pots. They are provided with lugs by means of which they are held to the top-plate.

By this method, the rings can be bored on the inside and turned on the outside without removing them from the fixture. At the same time it is certain that the eccentricity of all rings will be alike. The usual practice is first to finish the rings on the outside, after locating the work from the rough surface. The top-plate of the fixture is then turned so as to bring the inside concentric for boring. The boring is done in the usual manner from the turret-head tool-post of this machine. After the boring-tool has passed down a sufficient distance, the rings are cut off by means of the gang-cutter mounted in the cross-slide. This gang-cutter is shown in Fig. 5, from which it will be noticed that each cut-off tool is slightly behind the preceding tool, so that one ring is cut off at a time.

The second operation on the piston-rings is now being done on an engine-lathe, although a special machine is being built. This operation consists of facing off the sides accurately to fit the piston-ring grooves. In this operation the rings are held from the inside by means of an expanding mandrel screwed on the spindle-nose of the lathe. This operation, of course, precedes the cutting and notching of the piston-rings.

After cutting the slots in the piston rings they are re-turned to the finished diameter. First they are inserted in a split clamping-fixture, whose internal diameter exceeds the finished diameter of the rings by just the amount that is turned off. This clamping-strap is designed simply to hold the rings while they are mounted on an arbor provided with flanges, between which they are clamped while being re-turned. The arbor projects beyond these flanges far enough to be driven by means of a lathe-dog, while the arbor is supported on the lathe centres. Next, the rings are fitted into a combined testing-gauge and notching-fixture. This testing-gauge consists of a ring counter-bored to such a diameter that the piston-ring, when properly fitted with its ends touching, will just enter the counter-bore. This gauge is also provided with a drill-bushing on top and with feet below for resting it on the drill-press table.

The drilling operation is to provide the notch for the stop-pin. As only half a diameter of the drill is cut from the ring, the bushing is of the key-end type, forming a guide for the drill, clear through the thickness of the

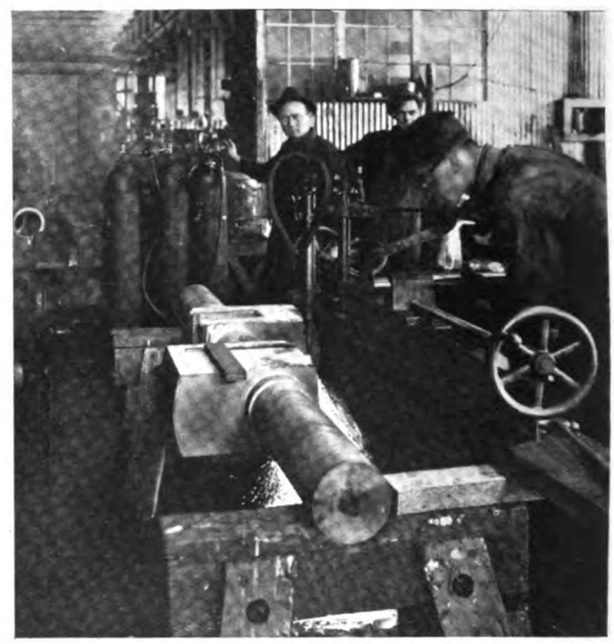

FIG. 6. TORCH-HOLDING MACHINE READY TO CUT WEBS

piston-ring. The slotting operation is done with a gang-saw on a milling-machine, the rings being held on a special fixture accommodating four or five rings, depending on the size. The fixture consists of an angle-plate bolted to the milling-machine table and presenting a surface against which the rings are clamped at an angle of 45° with the centre line of the spindle. On the surface of this plate are numerous holes into which are inserted pins to accommodate the different diameters of piston-rings. The rings are hung on these pins and located thereby. Regular clamp-straps fasten the rings solidly against the plate and a predetermined amount of

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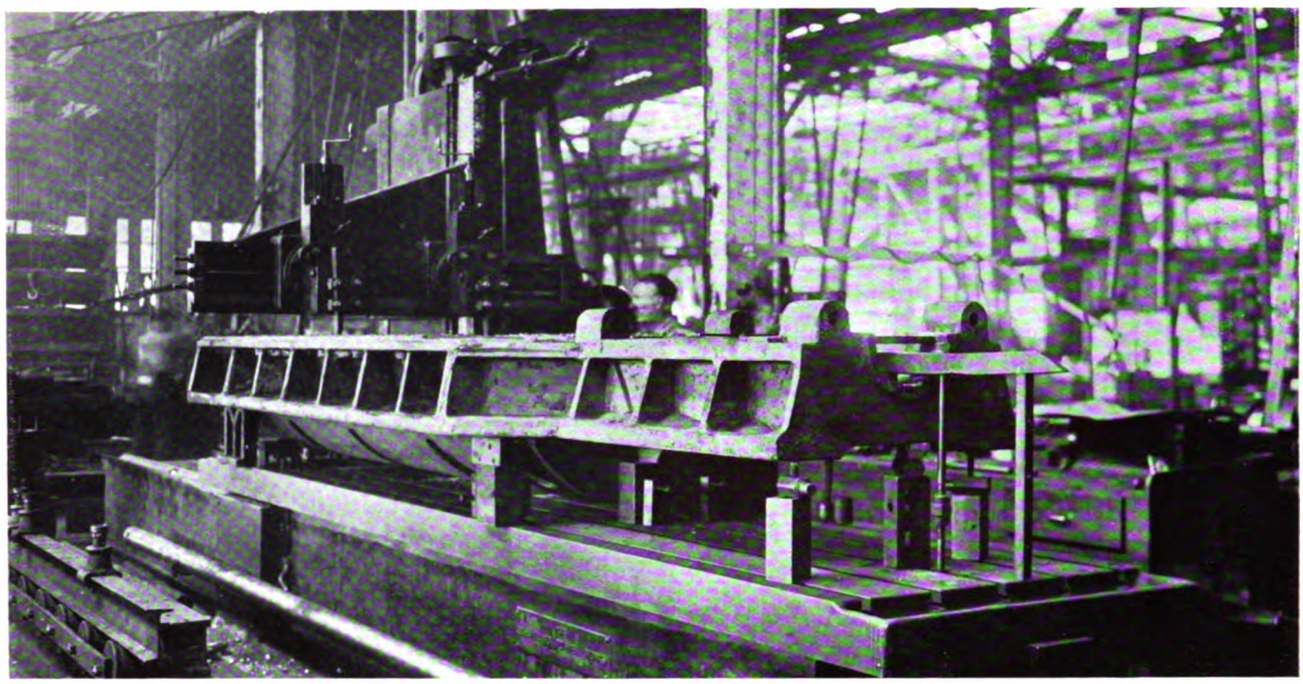

PLANING THE AFTER HALF-SECTION OF A 500-HP. SIX-CYLINDER SKANDIA ENGINE

material is cut from the ring, leaving a slight amount for a file finish.

Removing the material from the crank-webs is a troublesome time-consuming operation, and this is especially so on large crank-shafts, such as are now being made in the Skandia plant. Some time ago the company experimented with oxy-acetylene for cutting out the material but, except for very shallow cuts, it was impossible to control the flame. Experiments were then made with other gases, with the final result that all crank-web blocks, from the smallest to the largest shaft, are now taken out with oxy-hydrogen. The 500-hp. six-cylinder crank-shaft is approximately $8\frac{3}{4}$ in. diam. and by this method only seven minutes are required to remove the block from each web, a considerable saving over the old method, where drilling was used.

It has been found necessary to provide a light easily-handled machine for controlling the torch. This consists of a light I-beam frame on which are fitted bearings for a lead-screw for operating the torch-bracket. The lead-screw has a rather fine pitch, so that a proper feed of the torch can be obtained readily. For getting the cross-feed to the torch a cross-slide is provided in a similar way. This torch-holding machine is portable and can readily be moved around to the work, much more easily than bringing the work to a large drill-press, as was necessary with the old methods. A further saving was made by the release of the radial drills for other work. In a plant of this size, there is never any difficulty in finding work enough to keep the radial drills busy, and the result is entirely satisfactory.

When the oxy-hydrogen process of removing this material is used, the crank-webs have a slight tendency to spring, but it is an open question whether this is any more than when the drill-press is used. If sufficient stock is left for cleaning up, no bad results occur. The surface left by the torch is comparatively straight and much smoother than the ridges left by the drilling-out method. Fig. 6 shows the machine set up ready to cut one of the blocks.

In building the Skandia plant, including the extensions that have been recently made, both buildings and machine-tool equipment, the management has consistently tried to make all possible allowances for the expansion of the business and at the same time to keep the machines of such a character that they would be adapted to the widest possible range of work. The company being unable to foresee the manufacturing conditions that will prevail at the end of the War, and not knowing just what size and type of engines will be manufactured extensively in peace times, was obliged to make allowances for these conditions. As stated before, part of the equipment in the semi-automatic or screw-machine department consists of Steinle lathes. These lathes are all duplicates, which permits considerable flexibility in the placing of work. It is not necessary to have a particular machine tooled up for a certain operation, as any of the Steinle lathes can perform the same operation using the same tooling as was used on any other of these machines to do the work. It frequently happens that a certain operator, who is accustomed to turning small crank-shafts, is right in the middle of a run of bearing-liners, when it becomes necessary to put through another batch of crank-shafts. If necessary, this operator can be shifted from bearing-liners to crank-shafts, and can use any of the other machines that may be available.

All of the turning operations on the single-throw crank-shafts are now being performed on the Steinle lathes. The rough forgings as received from the forge-shop usually have about an inch of material on the diameter

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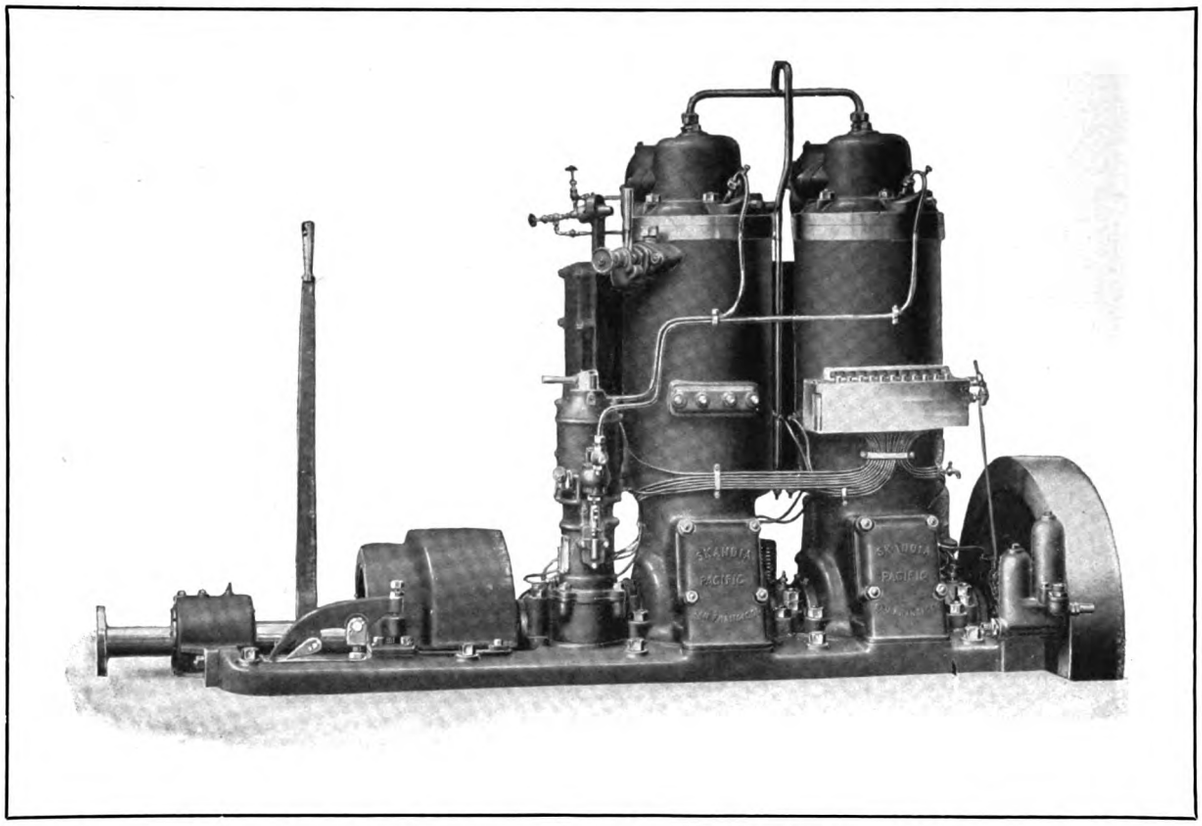
to be removed, while the sides of the webs usually have from 1 to 1¼ in. At the present time, the centring is done in the turret-lathes, but a considerable saving could be obtained by centring them, as well as cutting the shafts to length, before they arrive at the turret-lathe department. The shafts are first rough-turned between the centres, roughing out the journals and leaving a sufficient amount of stock to take care of any possible spring when removing the blocks. The shaft in the first operation is driven by means of the three-jaw chuck on the face-plate, the turning being accomplished by means of a tool mounted on the carriage. The outside diameter of the throws is also roughed, as well as both sides of the cheeks. In the next operation the pin is turned completely in the Steinle lathe to finished size at one setting, as well as the inside cheeks of the throw. It is held rigidly by a special holding-fixture, which supports the shaft, both on the sides of the cheek that have been previously planed, and on the main rough diameters. Crank-pins can be finished at the rate of about six per day of eight hours by this method. About the same time is required to reduce the shaft in the roughing operation from the rough forging. Finally, the shaft is finished on the journals between centres.

Assembling the engines on the floor is expedited by the erection arrangement. A 15-ton electric crane is now used in the main shop, which extends from the erecting-floor clear back and over the testing-stands. The larger engines are set for assembly under the main crane at right angles to the crane-travel. This makes it possible to set the heavy pieces, such as the bed-plate, crank-shafts, cylinders, etc., with the main crane. However, there are many smaller pieces weighing from 1000 to 2000 lb. apiece that have to be handled in the assembling of these engines. To provide for this work a jib-crane is provided to serve each erecting-space for the handling of such items as pistons, connecting-rods, cylinder-heads, and the like. These cranes are provided with Ingersoll-Rand 'Imperial' air-hoists. These hoists have a worm-drive, self-locking arrangement, which is desirable, as it frequently happens that a piece is suspended in the air for a considerable time. The old plunger-type of air-hoists, which were originally installed, were unsuitable for this reason, and they have been replaced by the worm-drive type of hoist. Because of the arrangement and relation of the testing and erecting floors under the same crane-way, the engines, when completely assembled, can be picked up and removed to the testing-floor, where they are tested either by means of a friction-dynamometer, or by a generator with water-rheostat.



SKANDIA TWO-CYLINDER MARINE OIL-ENGINE

As a result of both the shop arrangements and tooling methods, it has been possible to produce ten 120-hp. engines per month. Although the Skandia Pacific Oil Engine Co. is still new among the manufacturers of internal-combustion engines in this district, it has had a great opportunity for investigating and solving the many perplexing problems connected with quantity production of internal-combustion engines. The experience gained in the two years since the company was formed is now being applied to laying out the shops for manufacturing large Diesel engines, on which it will soon commence construction.

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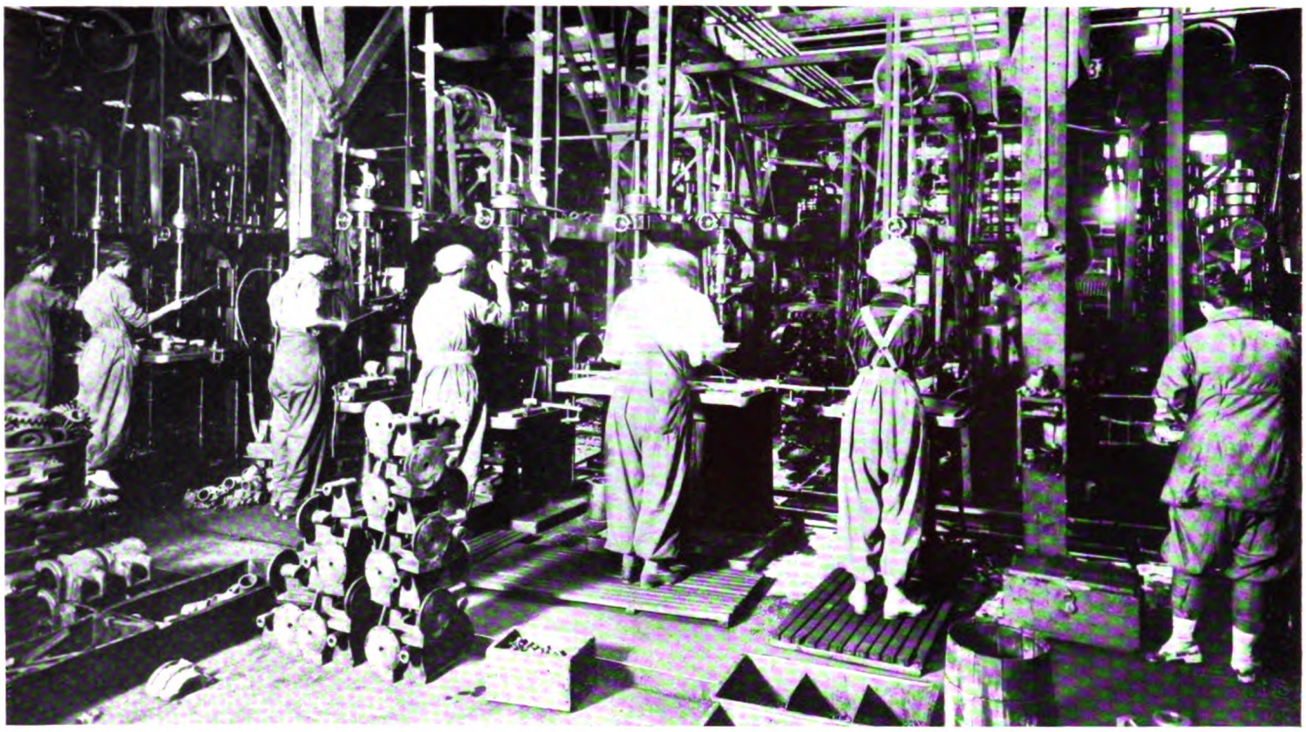

WORKING ON DRILL-PRESSES AT THE HOLT PLANT

Let the Women do the Work

By D. C. Fessenden

WHILE women have not been employed in the metal industries on the Pacific Coast to the extent that they have in the East and in Europe, several companies have been successful in replacing many of their drafted men with women. A short training course is advisable before the women commence work. Some jobs in the metal industries are, of course, not suitable for women, but they can be trained for a large part of the work.

THOSE who have the idea that the metal industry is dependent on men for labor, either skilled or unskilled, would change their minds if they took the trouble to investigate. Even in California, where the labor shortage is not felt as keenly as it is in the East, men have been replaced by women in a number of the simpler lines of employment in the metal industry, and very successfully too. Here in California employers have not had the experience with women employees that they have had in the East. There is a tendency to qualify remarks in regard to success with women by such statements as, "They have promise at positions within their physical capabilities," "They cannot sharpen their own tools," etc. These statements seem to be the result of inexperience, however, as it has been shown in the munitions factories of England that women can perform heavy common labor satisfactorily. As far as grinding tools is concerned, that is part of the day's work in some of the Eastern factories. No doubt there are some jobs that will always remain man's for some reason or other, but it is just as true that there are many jobs in every kind of shop that women can be trained to hold just as well as men.

Without going outside of California for examples, at the Holt Manufacturing Co.'s plant at Stockton, in both the inspection department and the core-making department, women are employed. More than that the 'foreman' in both departments is a forewoman. In Los Angeles, at the sheet-metal works of the Boyle Manufacturing Co. there are fifteen women doing electric welding and the employer comes out flat-footed and says they are more satisfactory than men. The women are not only more rapid than men but they seem to take more interest in their work and turn out neater jobs. W. J. Boyle, Jr., states that he had considerable difficulty with men and boys on the welding

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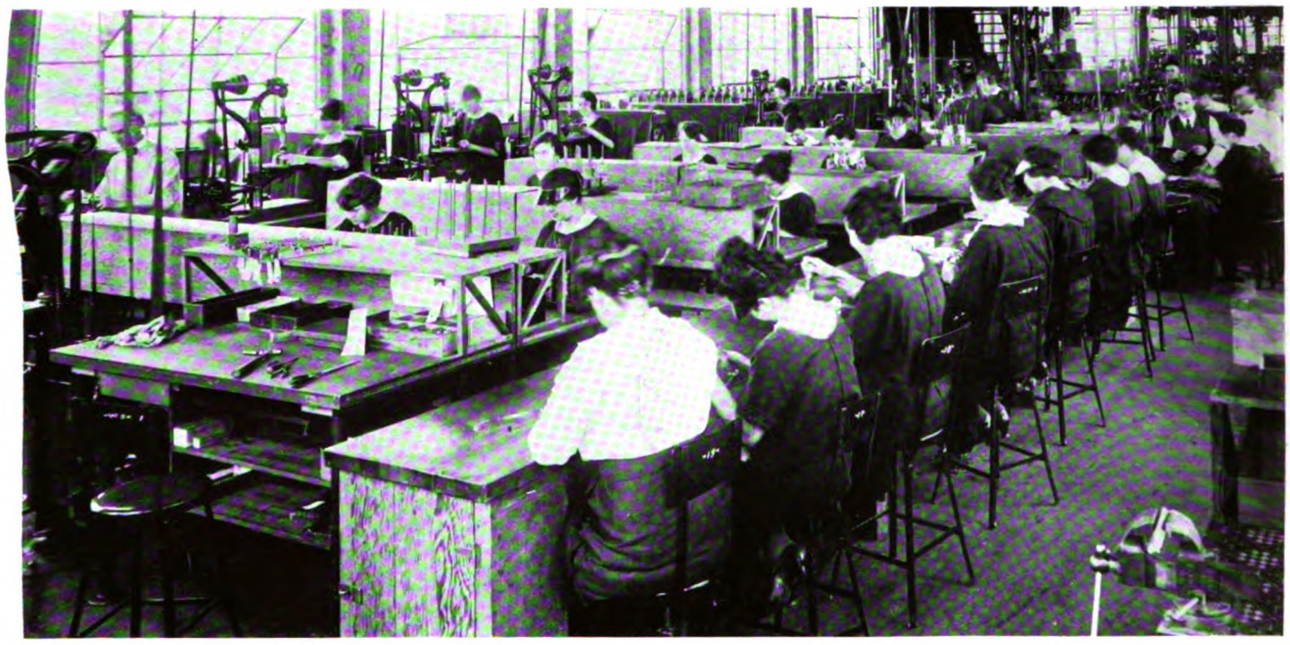

THE ASSEMBLING-ROOM AT THE MARCHANT PLANT

work, particularly after the draft went into effect, many going into the service and others into the shipyards or to the oil companies for work on pipe-lines. Furthermore, he states that boys are much harder to satisfy.

Women are being employed at the Southern Pacific shops in Sacramento. D. S. Watkins, the superintendent of shops, states, "The women who are now working for us are giving excellent satisfaction. These women are used to operate light drill-presses, bolt-cutters, turret-lathes, and in making light cores in the foundry."

Considering the fact that mechanical work, other than the kitchen variety, is not supposed to be woman's work, the surprising thing is that she can do it at all. Mechanical work about the home is left to the man as a rule. He puts up the shelf and fixes the sink, but a woman is not supposed to know enough to drive a nail without hitting her thumb. The man on the other hand starts his mechanical training making kites and fixing his bicycle. It can easily be seen what a tremendous handicap the woman labors under when she first attempts mechanical work. But there will be a different tale to tell in another generation after these mothers who are now working have taught their daughters how to fix the door-knob and to do the other mechanical jobs of the home that were formerly left to the men.

Preparation for Work

Experience both here and in the East shows that it is better because of increased efficiency to give the woman a good foundation by means of a short training-course rather than to start her right in on production without training and let her learn as she goes. As a matter of fact the latter method is beginning to be recognized as bad business with men also. With women, the preliminary training course is even more important as they do not have the mechanical background that the men have. At the start they are rather inclined to fear machinery. Until they gain confidence and are taught to make the simple every-day adjustments and repairs they are quite lost when a belt comes off or some other minor mishap occurs.

Eastern factories have regular training departments and this procedure is being followed in California. The Holt Manufacturing Co., of Stockton, has started a training school where the future hands are given a course of instruction under capable and sympathetic supervision. It is more satisfactory to teach the beginners only the work that they are expected to perform rather than to attempt to give them general mechanical training. The Marchant Calculating Machine Co., of Emeryville, which probably employs more women in mechanical work than any other firm in California, starts women employees on simple polishing and light drill-presses. When they become proficient at this work and used to the machinery they are shifted to more difficult work. Women who have had some mechanical training learn much more rapidly than the rest. One woman at the Marchant plant, who has proved to be particularly efficient at a certain intricate piece of assembly work from unfinished parts, is the daughter of a blacksmith, and she used to play about the shop and even helped her father at times. Her foreman stated that she was doing the work just as well as any man he had ever had and that he was going to pay her the same wages.

What Women are Doing

In the East the activities of women in the metal industries cover a much wider field than here on the Pacific Coast. In the industrial sections of the East at the present time women are doing every thing from common labor in gangs to operating the most intricate of machine-tools. Here in California the principal lines of

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MAKING CORES AT THE HOLT PLANT

employment for women in the metal industries are electric welding, core-making, inspection work, assembly work, polishing, grinding, and operating bolt-cutters, drill-presses, turret-lathes, engine-lathes, surface-grinders, milling-machines, and some other machines. They are also doing filing and other bench work as well as acting as stock and tool-room attendants. There seems to be no doubt that within their physical capabilities the women can be trained to do as much and as good work as men. In speaking of electric welding one employer said, "The women take more interest, turn out neater work, and are more rapid than the men we have had." A foreman said in regard to core-making, "In many cases they (women) are faster and neater on light work." Practically the same statement was made by the foreman in regard to light machine-tools. Of course it may be said that these are isolated cases and that the work is simple and light, but more could hardly be expected from women who have had no mechanical background or training. To be sure there are many lines for which women do not seem to be suited or adaptable. One firm has tried 14 women on engine-lathe work and they have all failed. However, this is a job where the operator has to stand all day, and women do not seem to be suited to standing jobs, particularly when they wear high-heeled shoes, as most of them do. At tool-grinding also they have not been successful in California, but this is probably due to the lack of proper preliminary training, as they are doing this work with good results in a number of factories in the East.

One cause of lack of success with women is that too much is expected of them. It is hardly fair to compare them with trained men. If a comparison must be made, it should be with such untrained labor as can now be obtained.

Labor Turnover

Experience from every source indicated that the turnover with women is much less than with men. The women are easier satisfied and do not want to shift from job to job as boys do. They quit and are discharged for fewer causes than the men. The principal reason that women quit is because the work is too hard or because the shop conditions are unsatisfactory. One foreman, when asked what was the chief reason for discharging women, laconically answered, "Talking."

Supervision

After they have been 'broken in' on their work, it is the universal opinion of the foreman that the women do not require more supervision than men although they probably get more as the foremen are interested in helping them make good. One foreman admitted that it was necessary to handle them with kid gloves as they were more sensitive and temperamental than the men, but aside from that the supervision was no different than for the men. Other foremen said that the same amount of supervision was required in their departments for both men and women.

Discipline

It is not necessary to have women and men segregated in different departments. On the other hand it has proved to be better to work them together as this has a tendency to keep the women up to the men's standard and the example and the instruction gained from watching the men has a beneficial effect. Where the supervision is at all capable there have been no evil effects from having women and men working together. Both are there for business and there is no more trouble than at a co-educational institution. However, some firms employing large numbers of women regulate the working hours so that the women leave the factory 15 minutes ahead of the men. They also employ matrons and welfare workers to see that the women are surrounded by the right influences.

Facilities for Women Workers

The requirements of the State law relating to the employment of women make it necessary only to provide separate toilet arrangements, but it is almost essential

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to provide a locker and dressing-room and a rest-room, where the women can eat their lunches. It pays in keeping the women satisfied and in reducing the labor turnover. At the Holt plant a lunch-room, a cloak-room with a locker for each woman, and a well-equipped kitchen have been provided. A matron is in charge, who will heat the girls' lunches if desired. A small library has been started so that the girls may read during the noon hour if they choose. This sort of arrangement is essential to keep the women happy and contented and appears to be a good investment in reducing the labor turnover alone.

Relative Wages

As a rule, women are started at lower wages than men and they usually receive less per day throughout. On the basis of output, however, the pay is practically the same for both sexes. There is some ground, however, for charges of discrimination against women in the matter of

WOMEN WORKING ON LATHES IN THE MARCHANT PLANT

pay, particularly the better trained and more efficient women. There is probably no deliberate intention to pay women less than men, but a woman may be hired for, say, two dollars per day, possibly all she is worth at first, and although she may become as efficient as a man in two or three weeks, the attitude of the foreman is, "Why raise her while she is satisfied?" However, this will work out satisfactorily in time, as the women compare notes in regard to wages to a greater extent even than the men.

The opposition of the unions to the employment of women is based on the assumption that it will lower the wage-standard. It is probable that, when they can be shown that such is not the case, this opposition will be overcome, particularly as women will not be employed to any appreciable extent as long as men can be obtained. The opposition now, however, is real and potent. One firm in the Bay district employed ten women, and with one exception their production was up to the men's standard within two weeks, but they had to be discharged because the business agent of the machinists' union made a positive threat to call out the tool and die makers unless this was done. The unfortunate part of the situation is that men cannot be obtained to replace the women.

Conclusion

Possibly women are not needed in the metal industries now since we are not yet using our man-power to its full capacity, nor using it as efficiently as possible. In the opinion of numbers of people more men are employed now in some war industries than can be used efficiently, and our reserves of idlers, waiters, taxi-drivers, barbers, and 1001 other occupations which women can hold have not yet been exhausted.

Women can unquestionably be used to advantage in the metal industries, and in the opinion of many the need will soon arise. The wise manager is investigating and preparing to meet the situation when it comes.

Curtailment of Production to Conserve Iron and Steel

The following list shows the industry curtailments already made by the Priorities Division of the War Industries Board that are of particular interest to the metal trades:

Stoves: For the last four months of 1918 curtailed to 50% of the production of the last four months of 1917, which 50% shall include Government orders.

Metal beds: For the last four months of 1918 curtailed to 50% of the production of the last four months of 1917, which 50% shall include Government and Allies' orders. No brass beds be built except from stock now on hand, and no brass or brass scrap be purchased.

Boilers and radiators: For the last four months of 1918 curtailed to 40% of the production of the last four months of 1917. All production and sale shall be under license from the War Industries Board or for Government buildings.

Gas-stoves and gas-appliances: For the last four months of 1918 curtailed to 50% of the production for the last four months of 1917. All copper to be eliminated except that on hand, which should be conserved for repairs to existing installation.

Tin plate: For the last three months of 1918 curtailed the use of steel 30% from consumption of the last three months of 1917, an estimated saving of approximately 150,000 tons of steel.

Refrigerators: For the last four months of 1918 curtailed $33\frac{1}{3}$% in iron and steel of the consumption for the last four months of 1917, with order for substitution of zinc plate where possible.

It is reported that some northern shops are not short of scrap because they make lots of their own.

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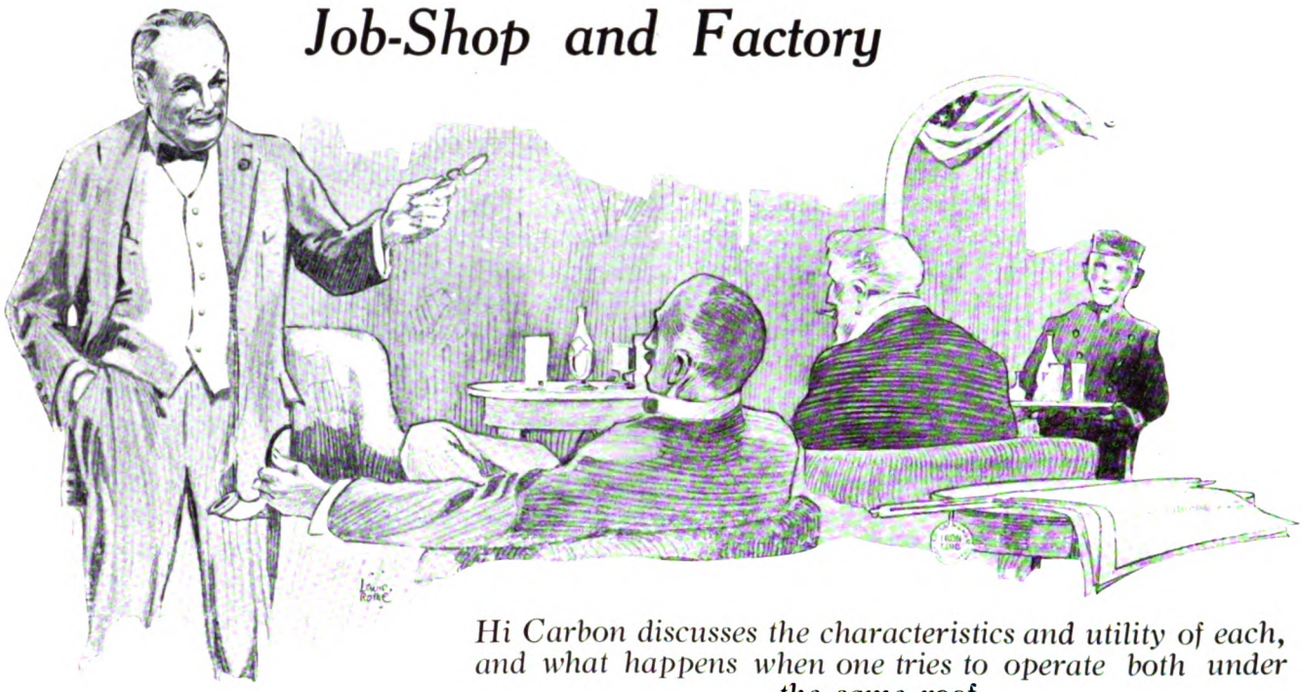
Job-Shop and Factory



Hi Carbon discusses the characteristics and utility of each, and what happens when one tries to operate both under the same roof.

SMITHERS and Pettigrew had both flopped into easy chairs before one of those tidy little round tables with a bell and an ash-receiver on it. The place was the Iron Club; the time was any Saturday afternoon after five. Visions of a dry California after July first, 1919, indicated the need for haste. Smithers smote the bell. It had been a hot afternoon.

The preliminaries were over, the cigars lighted, and Smithers proceeded to unburden himself of what was on his mind. "Times are good, if an overplus of business and an underminus of labor and material is any indication. A lot of our fellows haven't found out yet what hit them; they haven't had time. All they know is that they are working more men and turning out more stuff than ever before in their lives. They give little if any thought to the future. They have not yet done any real thinking, or made any plans as to what steps they are going to take to keep going after Uncle Sam quits running the country and the old competitive conditions return."

"Oh I don't know," said Pettigrew, "What's the use of worrying about that at this stage of the game. We've been up against it before, and I suppose we will be again. You can't make the average man worry about tomorrow's breakfast, just after he has finished a hearty dinner."

"That's just the trouble," said Smithers, "Josh Billings used to say that 'some peeples branes is located in their stummix,' and he was more than half right." Here comes Hi Carbon, let's see what he thinks about it."

"Hello, boys," said Hi, 'Deal me a hand. I'd like to sit in for a while." "Henry certainly knows how," said Hi, wiping his lips, after the S. O. S. had been duly answered. "I suppose Smithers is off again on his usual after-the-War stuff," said Hi, "and is wondering how long it is going to take for all the tools and equipment to accumulate enough rust to spoil its scrap value after Uncle Sam stops buying."

"That's all right," said Smithers, "But you know as well as I do, that, until about 1916 there was no such animal as a metal trades industry in California. Something was the matter, and has been the matter for nearly twenty years. In early days, California mining machinery went all over the world. After the big fire in 1906, all the business went East and staid there. We were puttering around in a hand-to-mouth existence, feeding off one another, making a few pounds of grate bars occasionally, some mine cars, a few gas engines, but mostly a little jobbing work and that was all. All the tall buildings in town were jammed to the guards with manufacturers' agents, who simply grabbed everything in sight for their Eastern factories. And —"

"There you have it," said Hi Carbon, breaking in. "Factory and job-shop. Our fellows have tried for years to make headway by bucking factory standardization and quantity production with job-shop methods and we simply got licked, and we are going to continue to get licked until we take a running jump at ourselves and get wise to the way the other fellow does it, and then get into the game right."

"In the first place, what sells anything?" said Hi. "Price, principally, confound it." "Price is the one thing that impresses everybody. You can talk yourself hoarse about quality, and the buyer isn't impressed worth a hang as soon as he finds that you are charging more for your stuff than your competitor. Certain standards of design, manufacture, and material have become established through years of usage and are staple. This is true of thousand of iron, steel, and brass manufactured articles. For instance, take pipe fittings, valves, plumbing supplies, and even certain stock engines, boil-

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ers, pumps, and lots of other machinery. It is difficult to tell the product of different makers apart, without looking at the brand or the trade-mark. Superiority in design of course, counts a great deal, especially if that superiority in design is reasonably clear without too much salesmanship and expense money, but the hand-made article has no place in the modern scheme of industrial life. It costs too infernally much, and really is not a bit better from the standpoint of service rendered than the product of quantity output, the things that are made by the thousand, in long lengths and then cut off."

"All right, then," said Smithers, "but how —"

"I know what's on your mind," said Hi, "You are going to ask how we are going to get our cost down, and all that. We've got to use our heads, that's all, in other words, take a leaf from the other fellows book and go after it."

Hi took a long breath, and continued. "Take cast-iron pipe-fittings for example. Flanges will do. You fellows get an order for say half a dozen at a time, in case any of the stores around town happen to be out of a certain size. You make a sketch of what is wanted, and turn it into the pattern shop. In due course a pattern is made, and finds its way into the factory. The boss molder goes out in the yard, and turns over a lot of flasks until he finds one suitable. Then the man on the floor rams the mold by hand; the castings are poured, probably from a heat that is suitable for anything from grate bars to engine cylinders. Then after the castings are cleaned they arrive in the machine shop. The boss machinist turns them over to the first machine that is idle and can do the work. The facing may be done on anything from a 12 or 48-in. lathe to a vertical boring mill. He does drill the holes on a drill press, which may be anything from a 12 or 18-in. to a good sized radial. The holes have to be laid out by hand. Nearly everything else has to be done by hand. Gosh! no wonder the job costs money. You know as well as I do, that is fairly typical job-shop procedure, and in filling orders for such things and under such circumstances, there is no way out of it."

"Now, on the other hand," said Hi impressively, "What is the factory procedure? It is something like this: Mr. Factory decides to go into the cast-iron pipe-fitting business. He gets complete schedules of the accepted standards from the American Society of Mechanical Engineers, the Bureau of Standards, or whoever it may be. Then he gets hold of his various shop foremen, the pattern maker, the molder, and the machinist. They decide how the patterns may best be made for an easy draw; they stick a lot of them on boards so that a multiplicity may be molded at once; they design and make special flasks, they install molding machines, jar-downs, as hand-ramming is out-of-date and expensive in its lack of uniformity and resulting lost castings. Then the boss machinist gets in his oar. Drilling-jigs are devised. There is to be no hand work in laying out holes. Everything is considered from all angles. After a while, they are ready to make flanges. They have also spent some money, quite a chunk of money in fact. This money is not expense however; it is an investment, which will be absorbed and amortized over a long period of time and the production of many thousands of flanges.

"They must have to get out a bond issue before they begin work," said Pettigrew, somewhat sarcastically.

"There you go again," said Hi, "You don't seem to see a factory running except through a pair of job-shop spectacles. What I have told you is only a part of it. Castings are put through by the heat instead of by the piece. Thus the proper mix can be obtained to suit the article to be made. The machine-shop work is done the same way. After the proper tools are rigged up, they run for days on just one thing of one size. The cost of rigging up is distributed over thousands of pieces instead of only half a dozen. You have no idea what a difference this method makes in your cost."

"Did you ever try it yourself, Hi?" asked Smithers, nudging Pettigrew with his off elbow.

"You bet I did," said Hi. "Once upon a time I was in the mining machinery business. Talk about competition, we had to buck all the big fellows in the East, and, believe me, it was some job. Nevertheless we weren't a bunch of quitters by a long shot. We used to scratch our heads many a time to devise ways and means of keeping above ground." "Our shop was like all the others in many respects, that is a combination between job-shop and factory, with the accent on the former. We would make anything for anybody if we thought he had the price, and when business was slack, we used to make up a lot of stock machines of one kind or another. These stock machines never seemed to be completed. When an order came in for one, there was a grand scurrying around to make missing parts, complete the assembly or some other darn thing. We'd get out the blue prints with 'stock' written all over them. That was the high sign to everybody in the shop to take their own time, no hurry, this is only a filler-in anyway, so, of course, the result was inevitable, high cost, and rotten satisfaction all around."

By this time Smithers and Pettigrew had let their cigars go out. They were interested.

"Finally one day, we got together and decided to try an experiment," resumed Hi. "Our shop foreman was a bright fellow. He had a head and knew how to use it, so here is what we did. An order was booked for twelve machines, and you may be sure that the word 'stock' didn't figure in it anywhere. The boss pattern-maker was in on it, and so was the boss molder. The job was given a right-of-way through every department. All the patterns went into the foundry at one time, everything was molded up and the castings were all poured in three successive heats, cleaned, and ready for the machine shop. The forgings went through the blacksmith shop in the same manner. Then the way was cleared for the machine-shop work. As fast as the various tools were made ready, the rigging-up finished, and the jigs gotten out, the whole job of machining was put through. Twelve complete sets of parts were carried to completion without interruption on any pretext whatever. The assembly was arranged by providing floor space for twelve machines, and they sure did go together in fine shape. All

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the babbitting of bearings for the entire twelve machines was carried through at once. The first thing we knew, the job was finished, and the machines, absolutely complete, were picked up by the crane and deposited in the yard."

"How much did they cost?" said Smithers, his mouth open a yard.

"Just an even twenty-five per cent less than they had ever been made for before," said Hi, triumphantly, "And mind you, the saving was really greater than that, as it was nearly all in the labor. Why say, we used to sell those machines at practically cost in order to keep some of the work in the West. We kept the same price, and a handsome profit was the result of just a little common sense mixed in with the scrap and pig-iron. Never again did we go back to the oldtime way of doing things. The fellow who came in with the usual hurry job at half-past four was shunted over to another shop, a job-shop, where he should have gone in the first place."

"How long did it take you to sell those twelve machines," said Pettigrew, who had been figuring on the back of his cuff the amount of good money that Hi had tied up.

"Our sales of that machine doubled within the year," said Hi. "The reason is simple. In the first place, we could quote prices that enabled us to meet competition. In the second place, we could offer immediate delivery, and that counted a lot, too. Then again, our experience with the first batch of machines stimulated thought toward devising little changes that would improve the design from a manufacturing standpoint, and it wasn't long before our machine made a reputation for itself as the best thing of its kind in the market."

"Well," said Smithers, reflectively, "That line of talk listens reasonable enough. I suppose, according to your reasoning, that every Tom, Dick, and Harry ought to refuse to do jobbing work, and go into specialty manufacturing."

"Not necessarily," said Hi, "But every shop ought to do one thing or another. It is a big enough job for any man to do a few things well. There is a need for job-shops and factories, both of them, but if anyone thinks he can run a factory on job-shop principles he is going to make a fizzle out of it, sure as shooting. There are a lot of smaller shops that are fitted for jobbing work, and little else. Then there are others which ought to consider seriously the development of a line of specialties, and go into it right. Specialty manufacturing is not a thing to go into in a haphazard way, either. A careful study of market conditions must be made, competing goods must be carefully scrutinized, the element of transportation cost must be considered, as the freight charge automatically shows how far you can send your product in competition with stuff made elsewhere."

"There is one thing you have left out of your grand scheme, Hi," said Pettigrew, "How is all this great output of yours going to be sold? In other words, how are we going to get the orders?"

Hi looked at his watch. "I promised to take my wife to the movies tonight, so we will have to knock off and call it a day," said he. "You have opened up another big subject. Let's meet in a week from now, and I can give you some pointers on that also. It isn't so hard as you think."

How to Start a Motor-Boat

1. Remove spark-plug, empty the carbureter—and crank the engine.

2. Sandpaper the flywheel, take off the commutator—and crank the engine.

3. Kick the pup, blow cigarette-smoke in the priming cocks—and crank the engine.

4. Disconnect the propeller, reverse the ensign, empty the gasoline-tank—and crank the engine.

5. Repeat a verse from the Koran, tie a wet towel about the cylinders, take off the lubricators—and crank the engine.

6. Take the motor entirely apart, put it together with your fingers crossed, drop a quarter in the tank—and crank the engine.

7. Crank the engine suddenly, without doing anything else. This often surprises it into running.

8. Turn your coat inside out, oil the rudder, throw the gasoline-strainer overboard, stuff a cushion in the flywheel and crank the engine.

9. Repeat the names of the prophets in Arabic, put a gumdrop in the cylinder, write your candid opinion of all gasoline engines on the stern, roll up your cuffs, connect the batteries with your watch, take off your necktie, yell "HELL" into the gasoline tank—and crank the engine.

There isn't the least sense in any of these rules, yet each one has started an engine in its time.—Spokane 'Spokesman-Review.'

A CRACK in your chimney is a sure sign that you are going to move.

If you dream of smelling smoke, it is a sign you are asleep and had better wake up.

To see a paper-hanger papering over a flue-hole indicates an impending loss.

It is bad luck to look in a dark closet with a match.

If you can see your shadow from an oil-lamp while filling a gasoline-stove it indicates a crowd of people coming to your house.

When the wind moans it is extremely bad luck to burn trash near the house.

If you smell gas or gasoline and look for it with a light it foretells that you are about to start on a long journey.

Even if your house and furniture are 'covered by insurance,' it is extremely unlucky to have them burn on Friday, the 13th.—Bulletin North Carolina Insurance Department.

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Trade Acceptances and the Metal Industries

THE trade-acceptance system of doing business retains all the advantages of the open-account system and eliminates many of its disadvantages. It is estimated that the general adoption of trade acceptances would increase the country's credit facilities at least 20% without inflation.

'IN time of war prepare for peace' is the motto of the officials of the Federal Reserve Bank in their campaign to bring the trade acceptance into general use. The rapid expansion of all war business and the necessity for supplying it with credit may lead to inflation and then to a tight money-market with the consequent panic and failures. Authorities recognize that panics are caused, not by a lack of capital in the country, but by lack of fluidity or availability of capital for financing business operations. The present open-account system leads to inflation and speculation since credit is not based on a tangible transaction in goods. Furthermore, in the chain of transactions between manufacturer and ultimate consumer, credit is tied up for a considerable period in each deal, and a failure to pay on time at any one link affects the credit of the whole chain. The following is a typical example of the open-account system and shows how part of the country's credit is tied up and withdrawn from use by each transaction.

Jobber & Co. sells a lot of machinery to Smith & Brown and bills them net 60 days, which, by the way, means to the tenth of the following month or 70 days. When payment date rolls around, Smith & Brown write and ask for an extension of thirty days as they have not been able to make some expected collections. This, Jobber & Co. is forced to grant as there is no recourse. But there is one more transaction and that is between Jobber & Co. and the bank for money to finance the business because of the outstanding account of Smith & Brown and 101 others like it. Not only does Jobber pay thousands of dollars in interest charges every year, but a worse feature of the present credit-system is that the tying up of his capital and his limited borrowing power reduces the volume of his business and consequently his turnover. This system is a result of disturbed business conditions following the Civil War. The open book-account system with cash discounts was an outgrowth of the practice of giving large discounts to encourage prompt settlement as there was considerable risk in granting long credits in that unsettled period. This system has outlived its usefulness.

Trade acceptances, although not new either in this country or abroad, have been given a big impetus here by the Federal Reserve Bank, which has agreed to accept them for re-discount from its member banks. Roughly speaking, the trade acceptance because of its value as negotiable paper makes a cash sale out of the usual 40-day transaction. As an example of the working of the trade acceptance we will say that Jobber & Co. order a number of lathes from the Tool Manufacturing Co., which encloses with the invoice a trade acceptance or bill of exchange which reads like this:

> Cleveland, Ohio, June 1, 1918
>
> On August 1st 1918, pay to the order of ourselves Ten Thousand Dollars Value Received and charge same to the account of Tool Manufacturing Co. To John D. Jobber & Co., San Francisco.

When this is received by Jobber, he writes across the face of it in red ink:

> Accepted June 10, 1918. Payable at National Bank, San Francisco, Cal. Signed: John D. Jobber & Co.

This is now what is called two-name paper and can be immediately discounted by the Tool Manufacturing Co. at its bank, and re-discounted by that bank at the Federal Reserve Bank at a preferential rate. By this system, credit is available to the Tool Manufacturing Co. almost as soon as the invoice is sent. The bank is much more willing to discount the trade acceptance than to lend on the Tool Manufacturing Co.'s note, as the trade acceptance has two names on it and furthermore it can be re-discounted at a lower rate at the Reserve Bank. As a matter of fact the deal is a transaction in commercial paper rather than a loan by the bank. This feature alone justifies the trade-acceptance system as it does not deplete the bank's reserves and will thus do much to eliminate the tight money-market.

To follow the machine-tools further, Jobber & Co. get trade acceptances from their customers at the usual terms and can, if they wish, discount them at their bank in time to take up their indebtedness to the Tool Manufacturing Co. So the whole transaction has practically all the benefits of a cash deal from manufacturer to consumer, and yet everyone concerned has the usual terms.

Anyone can see the benefit of the trade acceptance to the seller, as instead of the old unsecured open account, he gets a negotiable time-draft from his customer which the customer cannot very well dishonor without hurting his credit. As far as the banker is concerned, he is able to estimate the security for his loans from his knowledge of the acceptor as well as a knowledge of the drawee of

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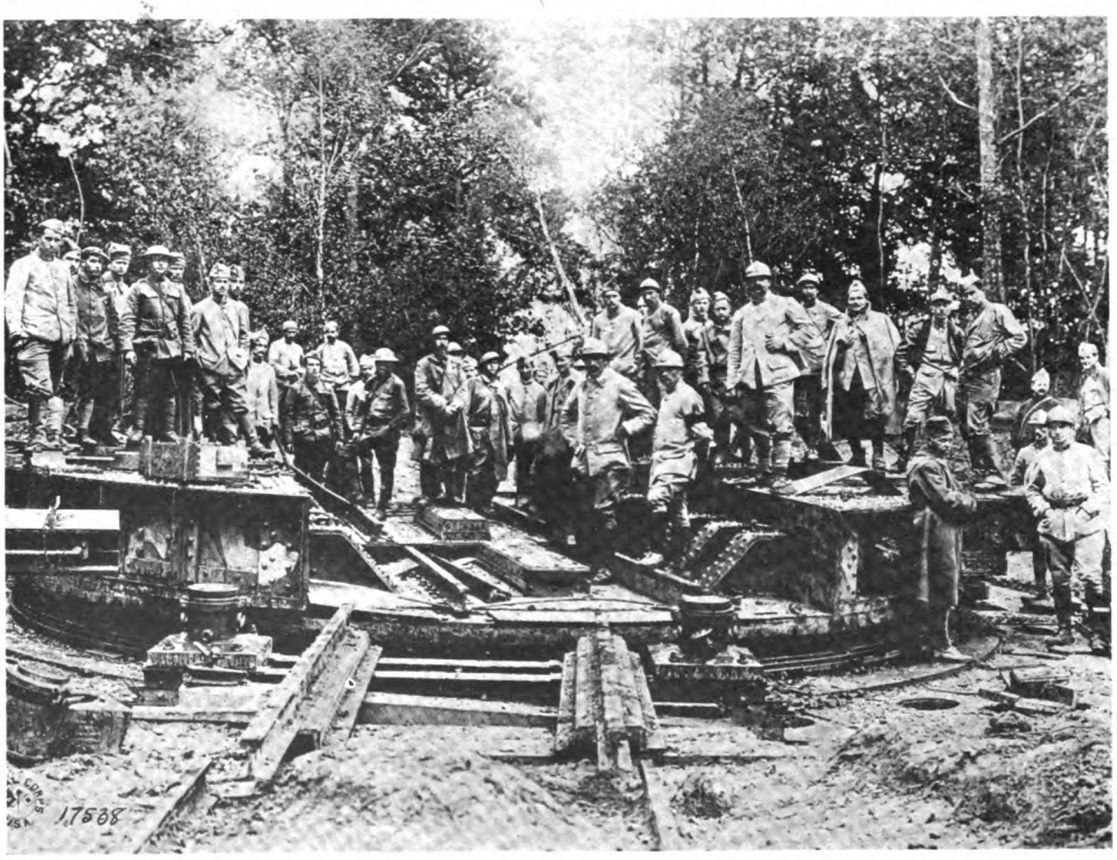
the paper whereas with the loan on the open account he must depend on the appraisal given by the borrower.

The buyer may say: "Why use the trade acceptance when I can be carried on an open account, in which case I do not have to repudiate an accepted debt if I do not find it convenient to pay on the due date?" The answer to that is that he is only meeting his just obligations by paying on the due date. If he intends to meet his obligations there is no reason for not using the trade acceptance and if he does not intend to do so, the refusal to use the acceptance will advertise the fact. The buyer using trade acceptances is considered a better risk than those who insist on the long-time open-account and his rating is classed with that of the man who pays cash. It is recognized that the use of the trade acceptance has a tendency to prevent over-buying as the buyer hesitates to assume obligations that he is not sure he will be able to meet when due. The buyer does not assume any more obligation by giving a trade acceptance than he already has assumed when he ordered the goods, that is, to pay the bill when it is due. He assumes no obligation until after the seller has relinquished title to merchandise of equal value to the amount represented by the trade acceptance.

The adoption of the trade acceptance throughout our credit structure would in no way destroy any of the advantages of the present open-account system. Long terms may be given or extensions made with equal ease under either system. The advantages all lie with the trade acceptance, and as great as the benefits are to the individual banker, jobber, wholesaler, retailer, or consumer, the greatest benefit will accrue to the whole credit of the country. It is obvious that credit based on two-name paper representing an acknowledged transaction in merchandise is much safer and more liquid than that based on single-name notes valued on the character and intangible credit of the drawer or upon questionable book-accounts. It is estimated that the universal adoption of trade acceptances will increase the country's credit facilities 20% without inflation and will go far toward remedying the unscientific and inelastic banking system now in vogue.

An Irishman came into the office of the president of the Illinois Central railroad and said: "Me name's Casey. Oi worruk out in th' yar-r-ds. Oi'd loik a pass to St. Louis." "That is no way to ask for a pass," said the president. "You should introduce yourself politely. Come back in an hour and try it again." At the end of the day back came the Irishman. Doffing his hat, he inquired: "Are yez the man I saw before?" "I am." "Me name is Patrick Casey. Oi've been worrukin' out in th' yar-r-ds." "Glad to know you, Mr. Casey. What can I do for you?" "Oi've got a job an' a pass to St. Louis on th' Wabash. Yez can go to hell."



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EMPLACEMENT FOR ONE OF THE 75-MILE GUNS THAT SOME AMERICAN SOLDIERS HAVE PERSUADED TO CEASE BOMBARDING PARIS

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New Freight-Handling Equipment on the San Francisco Waterfront

THE State Board of Harbor Commissioners is preparing to increase the freight-handling equipment now in use on the San Francisco waterfront. In general the program will be similar to that recommended in a report recently prepared by a committee of the San Francisco Chamber of Commerce on the general subject of improved port and harbor conditions.

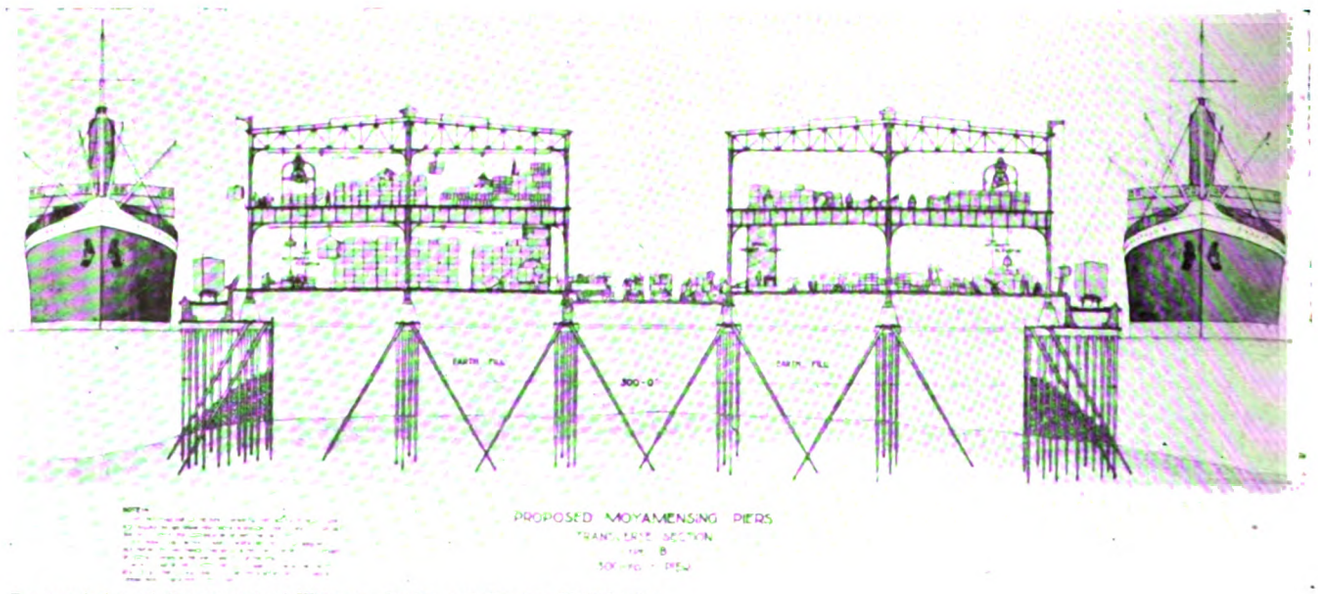
In brief the part of the report relating to freight-handling recommended that to reduce freight congestion on docks, freight-handling equipment should be provided to facilitate removal of goods from docks. The particular devices recommended were as follows:

First, provision of electric piling-machines on all docks.

Second, provision of at least four self-propelled traveling cranes, capacity five to ten tons. If the utility of these cranes is demonstrated fully, more cranes should be purchased so that there would be at least one for each dock. These cranes could be used for handling and piling heavier pieces than the piling machines could handle. These cranes should not run on tracks but should have wide tires with wheels arranged so as to turn in a short radius. They should be equipped to run anywhere on a dock and from dock to dock.

Third, placing of gear for unloading along the whole length of each side of the dock. This gear would consist of upright masts spaced the proper distance apart, resting on the dock at the edge of the shed and inclined out-

FIG. 1. PORTABLE LOADER PILING BAGS OF SUGAR IN A SAN FRANCISCO WAREHOUSE



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PIER-DESIGNS AT PHILADELPHIA, SHOWING CARGO-MASTS

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ward. These masts would be connected by a wire cable, holding blocks that can be moved to the proper positions to operate in the hatchways of different vessels. A line running through these blocks operated by electric power on the dock would handle one additional gear so that an extra gang could be worked at each hatch.

Fourth, more space in the bulkheads should be used for the receipt and delivery of cargo. Mechanical devices such as overhead carriers and electric tractors either with or without trailers could be used to carry cargo to and from the bulkheads.

Fifth, unusually heavy single pieces can best be handled by floating cranes. At present there are privately-owned cranes that can handle 50 tons and sheer-leg derricks that can handle 100 tons, but it would be better for the State to own such equipment.

FIG. 2. PORTABLE LOADER PILING SACKS

Sixth, belt-conveyors and other conveyors should be used for unloading river boats.

Seventh, night work should be expedited by increased electric lighting facilities on the piers.

Quotations have been obtained from several manufacturers on portable conveyors of the general type shown in Fig. 1 and 2, which are manufactured by the Brown Portable Conveying Machinery Co., of Chicago. Such machines are in use in many places, for piling, for loading on wagons, and for transporting goods horizontally for short distances. Plans are also being prepared under the direction of F. G. White, chief engineer for the State Board of Harbor Commissioners, for the construction of cargo-masts on pier 41. These masts will be constructed by the State. If they prove satisfactory, similar masts will be constructed on other piers.

Shipping-Day Plan for Less-Than-Carload Freight

On September 16, what is known as the shipping-day plan for handling less-than carload freight went into effect on all government-controlled railroads in California. This plan, which has been highly successful in the East, provides that shipments to certain designated points from San Francisco, Oakland, Los Angeles, Fresno, Sacramento, Stockton, and San Jose will be handled tri-weekly, semi-weekly, or weekly, as the case may be, and will be received for shipment at those times, instead of daily, as during the past. R. L. Ruby, superintendent of transportation for the Southern Pacific, Western Pacific, and Tidewater Southern lines, predicts that this plan will save about five hundred cars per week and increase the average load per car about two thousand pounds. A Shipping Day Guide has been issued and distributed by the Railroad Administration to its agents and to shippers, in which the details are given as to the method to be followed.

In general, where a town is served by more than one line, its business will be turned over to the carrier best able to serve it. For example, the Southern Pacific railroad will handle business from Los Angeles to San Francisco, on the Valley line, on Tuesdays, Thursdays, and Saturdays; and on the Coast line, on Mondays, Wednesdays, and Fridays. Freight from San Francisco to Stockton will go by the Southern Pacific; to Marysville by the Western Pacific; to Merced by the Santa Fe; to points north of Santa Rosa by the Northwestern Pacific.

THE welfare worker glanced around apprehensively as she entered the humble dwelling. "Are you not afraid to live here? I do not see any fire-escapes."

"Law, no, miss, I don't need one," returned the satisfied slum dweller. "Whenever the cops come up after me I make my getaway over the roof."—Pittsburgh 'Chronicle-Telegraph.'

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THE WASTES OF THE WEST

By MINER CHIPMAN

THIS is the first of a series of articles by Miner Chipman on 'The Wastes of the West.' Mr. Chipman is a real efficiency engineer, but, as will be seen from a perusal of this article, he has some ideas about efficiency that are unusual.

EVERY stranger paying his first visit to San Francisco is shown the beauties of Golden Gate Park. He is taken for a drive through Nineteenth avenue, and shown the stretch of dreary sand-dunes, and then ushered into the verdant paths of the Park. Once upon a time these lovely spots were rolling hills of shifting sand. The peculiar magic touch that has characterized San Francisco for more than half-a-century, has transformed the wastes of sand into the finest playground of the Nation.

Golden Gate Park, a magic transformation of a desert waste, is typical of the people and the labor of the West. A superficial survey of these transformations would pronounce the result as marvelous, but fail in an adequate appreciation of the tremendous labor that made the transformation a reality. The ideals of art and industry can be made real and useful things only when ideas are given action. The measurement of ideals and art is ultimately expressed in the direction and efficiency of labor. California has been a land of artists and idealists, but all of its art and all of its ideals have been made real by workmen having the appreciation and ability necessary to the performance of big and noble tasks. California is famed for her mountains and her valleys. The Californian boasts of her climate and her scenery. The greatness of California, however, is not found in the gifts that nature showered so bounteously upon her. The wonder of this land lies in the work done by men to make the land accessible. The finest highways in the world are found here. They span the valleys, climb the mountains, and cross the high Sierras.

California is the largest playground in the world, and the people of California know how to play. Watch the long procession of automobiles upon the highway on a Sunday afternoon. Expensive cars are frequent, but not the rule. Anything and everything that 'will run' is out upon the highway. Five-passenger cars carry a superburden of seven or eight. Father and mother and all the children are out for a spin down the valley, or for a breath of air in the mountains. In the shade of a pepper-tree, beside a mountain stream, or on a green spot overlooking the valley, you will find a picnic party. They are not rich, they are not poor, they are just plain every-day Californians. That fellow over there with his flivver loaded with tents and children, spends some of his time in a machine-shop as an avocation. Let us call him Bill Scriver. There are thousands just like him on the highways every Sunday. Ask Bill a few questions concerning life and life's meaning, and you will secure some first-hand information concerning the labor problem in San Francisco. In the first place, Bill works to live, and does not live to work. To live, for Bill, is to get the family out and away from the city for a week-end, and drive a car of his own, and picnic beside a stream somewhere in the Santa Cruz mountains. He has no interest in the INDUSTRIAL DEVELOPMENT OF SAN FRANCISCO other than that of providing him with the means of satisfying his love for the great out-doors, which in California is a bit of Paradise regained. Bill accepts no Eastern standards of progress and civilization. A pall of smoke from a thousand factory chimneys hovering over San Francisco bay would bring no thrill of joy to him. He wants no pall of smoke anywhere in California. From his boyhood he has grown to love the trails. He knows where the trout are the finest; he knows where the deer may be found; he knows more about the great big land beyond the limits of the town than he will ever care to know about machine-shop practice. Bill measures Efficiency in the broadest terms of life. He will work, and work hard for a little while, but he will not work all the time for any man. He insists upon having his fun. He knows nothing and cares less about foreign trade, industrial development, and high finance. He knows a great deal, and wishes to know more about the lore of the woods and the mysteries of the mountains. Bill is not in the habit of showing his sentimental moods. He talks of the city and thinks in the terms of the country.

On the surface, it would appear that Bill wastes much time. But, does he? How much fun doth a Man require? That is the question underlying the problem of employer and employee in San Francisco. This question has a much deeper significance than we would at first imagine. We are inclined to look upon the industrial relations problem as something highly complex. It is in reality exceedingly simple. How much Work should a man do to entitle him to his quota of Play? Around this question has arisen the trade-

WE are inclined to look upon the industrial relations problem as something highly complex. It is in reality exceedingly simple. How much Work should a man do to entitle him to his quota of Play?

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union movement. The labor union is really only an efficiency organization. It is fighting for a kind of 'efficiency' which has little or nothing to do with the output of industrial plants. It is not the 'efficiency' of the 'expert.' The trade union is a collective expression of the ideal of 'work to live, and never live to work.' It is natural that there should be a conflict between the employer and the worker upon that issue. Bill and his Boss can never quite agree upon the meaning of efficiency. But it is all very encouraging. So long as the labor problem rests upon such a foundation we have little to fear. Radicalism and I. W. W.-ism do not grow in California soil. 'Wage-Slaves' cannot exist in California. With the spirit of play manifest on every hand, and with men ready to fight to maintain the right to play, we may look forward into the future without fear. In the long run, the employer will secure the maximum of human efficiency. It will be the right kind of efficiency that the Californian can accept without surrender of his treasured ideals. It will be a proper balance between the shop and the trail; between the machine and the highways; between his tools and his trout rods.

The employer in San Francisco does not complain about the 'high wages.' He is willing and glad that Bill should have his 'flivver.' The dispute between Bill and his Boss concerns the amount of work to be done to entitle Bill to his quota of fun. The Boss would have Bill speed up, and when Bill refuses to be speeded, the Boss cries, 'Restriction of output.' When the Boss asks for more work and full-time hours, Bill cries, 'Restriction of fun.'

Both are right, and both are wrong. A balance is wanted. We must preserve the spirit of play, and we must have a fair day's work for a fat pay-envelope. How can that balance be found?

Too much work and too little play is bad for Bill. Too much play and too little work is bad for the Boss. Too much work and too little play will make Bill a member of the I. W. W. Too much play and too little work will end in Bill becoming a hobo. It costs money even to run a flivver.

This spirit of play is not one of the wastes of the West. It is the foundation upon which an industrial empire will be established. The spirit of play is a fore-token of efficiency, and the hope of industrial peace.

HERE are a few answers to examination questions collected by the New York State Education Department in the past year:

Benjamin Franklin produced electricity by rubbing cats backwards.

Lincoln had a woman make him a suit of homespun from rails which he had split. They were hickory rails, hence hickory shirts.

The Spoils System: The place where spoiled things and waste are kept. The Board of Health has largely taken the place of this.

A NEW FOUNDRY was started in Oakland last week. It has a corner on the Oakland scrap-market. The stock consists of the following:

27	eggbeaters.
7½	sewing-machines.
5	air-tight heaters.
3	gas-stoves.
14	sash-weights, miscellaneous.
1	cracker-box.
3	meat-grinders.
1	elevator counter-weight.
7	motor-cycle cylinders.
1	box assorted hair-pins.

Note. Foundrymen keep away. Watchman on duty day and night.

NORAH was a new servant-girl in the employ of the Browns, and hardly had she been 24 hours on the job before she had the misfortune to drop a piece of roast beef on the floor.

Roast beef that has been used as a mop becomes just a bit gritty to the taste, so Norah thought it the part of wisdom to consign it to the garbage can.

"I think, Norah," remarked Mrs. Brown, rambling into the kitchen later in the day, "that we will have some of that roast beef cut cold for supper."

"Sure, an' Oi'm sorry, ma'am," responded Norah contritely, "but the cat got it when Oi wasn't lookin'."

"The cat got it!" exclaimed the mistress. "What cat?"

"Jay whizz, ma'am!" rejoined Norah, with a worried look. "Ain't there no cats?"—Fresno Republican.

THIS one wears whiskers, but it illustrates a good point and is worth repeating. There was a negro stage-driver who was dexterous in the use of the blacksnake. He could flick a fly from a mule's back with the greatest accuracy. Sunflowers were beheaded with neatness and dispatch. One day he was showing off his prowess to a drummer on the box and had killed two bees and a butterfly without making a miss. As they drove near a tree the drummer said:

"Let's see you hit that hornets' nest, Mose."

"No, suh," said Mose; "I ain't goin fur to hit no hornets' nest."

"Why, what's the matter with the hornets' nest?"

"You hit 'em an you'll see what's de matter wid de hornets. Dey's organized, dat's what's de matter."

I SEE by the papers that the Allies have taken 10 metres on the Somme front.

Oh, isn't that fine. Now the Germans will not be able to use so much gas.

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Opportunities for Crippled Soldiers in the Metal Industries

By ELSIE PLAUT

CRIPPLED veterans of former wars were usually rewarded with an opportunity to sell pencils on the street-corner, with perhaps a pension on the side. The new way is to help the cripple to self-support and not make him an object of charity. There are many jobs in the metal industries that a cripple can fill to advantage.

AFTER the War the labor problem will assume a new form. Peace will bring with it many readjustments of present abnormal conditions brought about by war. The returning soldier, coming back to his community, will be unable perhaps to resume his former occupation. The injuries he received may make it unfeasible for him to continue earning his livelihood in the way he did before he joined the colors. One of the things that the experience of this war has taught us is that merely because a man is physically handicapped, he is not necessarily disqualified from being a happy self-supporting cit-

Upper left-hand corner, machine-shop at the Belgian School, Port Villez, France. Lower left-hand corner, oxy-acetylene welder. At right, cripple operating tin-cutting machine.

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izen engaged in productive work within his community.

The countries abroad have tried vocational training of the crippled soldier. The Red Cross Institute for Crippled and Disabled Men in New York has experimented in its workshops with the disabled man of industry. In both instances, the results have been so encouraging that it is logical to assume that a life of useful activity awaits the handicapped man if he has the will to succeed.

According to the Vocational Rehabilitation Act recently enacted by Congress, those disabled in the military and naval forces of the United States have been placed under the joint authority of the Surgeon-General of the Army and the Federal Board for Vocational Education. The Surgeon-General has jurisdiction from the time the person is injured until he is restored to good physical condition, when he receives his honorable discharge from the service. The Federal Board then offers him vocational re-education and training, which will enable him to return to useful active employment. The U. S. Employment Service will co-operate in finding him a job.

Since this provision has been made, and since our own Government as well as the European belligerents, is giving the disabled soldier an opportunity to establish himself in a new trade, it becomes merely a question of discovering the particular line for which each man is best fitted.

The Red Cross Institute for Crippled and Disabled Men, through its research and investigation departments, has made a careful survey of the industries in which labor conditions are favorable and has found out just what a disabled man can do. It has discovered particularly advantageous openings for handicapped men in the machine, engineering, and allied trades. It is the experience of instructors in technical schools that any man that can get around on artificial legs can do all but the heaviest work in machine-shops, and that one-armed men can do lathe work, planing, drill-press work, and milling. As engineer, fireman, welder, inspector, tester of electric apparatus, assembler, draftsman, or bench-lathe hand, a man that might appear to be incapacitated by the loss of one, or even two, legs, can compete successfully with the physically normal workman, to the satisfaction of himself and his employer. A one-armed man, provided with a modern scientific substitute for the missing one, can be an efficient lathe-hand, solderer, a shaper, or a hand oxy-acetylene cutter. For the minor machine operations, generally, a man must be able to stand, though, in some cases, arrangements can be made for him to sit at his machine. Full use of only one hand and arm is necessary. A man with an artificial leg would not be disqualified, provided he could move about freely.

The light work, at which the man is supposed to begin, is on the capstan-lathes, and at light drilling, which is particularly suitable, as he can sit at his work. Grinding, light planing, shaping and slotting, carpentry, and even the operation of some of the lighter power-presses are all possibilities for the partly disabled man. In the welding department, the opportunities are practically limitless. At the end of a three months' course, a disabled man can become a self-supporting cutter or welder.

Even from this hasty summary there is evidence that this vocation, preceded by a short period of intensive training, can furnish an excellent opportunity for the disabled soldier. So important and so constantly growing is the industry, that it is an ever expanding field for expert labor. The machinist trade is one of the most widely spread industries, carried on in almost every part of the country, and it is allied to many other important ones. That, and the fact that it offers excellent working conditions, make it particularly desirable as an effective field for endeavor.

A crippled man can work—efficiently, courageously, faithfully, competently. The Government is planning to give him the preliminary instruction, and after that the employer and the worker will find their most optimistic expectations fulfilled.

THE toothsome duck
Is out of luck;
And it can well lament,
That sports are free
With fiendish glee
To shoot to heart's content.
Soon it can quack a gladder song,
As hunting season isn't long.

Across the pond
The Yanks are fond
Of hunting's joys divine.
With bombs and guns
They're chasing Huns
Back to the river Rhine.
The Boche complains with valid reason
For him it's always open season.

A WELL KNOWN firm has the following sign on the office-wall.

"If you work for a man, in heaven's name work for him. Speak well of him and stand by the institution he represents. Remember an ounce of loyalty is worth a pound of cleverness. If you must growl, condemn, and eternally find fault, resign your position and when you are on the outside, damn to your heart's content, but as long as you are a part of the institution do not condemn it. If you do, the first high wind that comes along will blow you away and probably you will never know why."

A 'FELLER' wanted exemption from service the other day because he was working on essential war work; he says he is engaged in molding sash-weights for a building that makes paste, which is used in fastening blue-prints to specifications required for the construction of a pier that will be used for shipping when it is built.

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Employment Managers Graduate at the University of California

By A. T. PARSONS

WAR conditions have accelerated a movement that was already gaining headway in many industrial plants, namely, to place all activities pertaining to the relations between the company and its employees in one department, headed by an employment manager. The first course in employment management ever given on the Pacific Coast was recently completed at the University of California. The employment manager should rank next to the general manager of a plant and his activities include many things besides 'hiring and firing.'

SOON after the United States entered the War it became evident to the War Industries Board that if efficiency were to be obtained in the industries of the country as a whole and the war industries in particular, labor turnover must be reduced and general industrial relations improved. Many progressive companies had already established employment-manager departments as one means of accomplishing these ends. A number of other companies were ready to establish such departments, but were hampered by being unable to find suitable men and women to act as employment-managers. To remedy this condition, an 'Employment Management Division' was added to the War Industries Board to cooperate in training employment managers, primarily, but not solely, for plants working on war contracts. Courses for training employment managers are being given at several universities. Universities situated in industrial centres are selected so as to enable those taking the courses to visit industrial plants for 'laboratory' practice in addition to the lectures and reading. In general the students taking the courses have been sent by the firms employing them, and it is expected that on completion of the course, the students will return to their own employers and take up employment management. Most of the firms continue their employees' salaries while taking the courses, this indicating the importance they attach to the work. Provision is also made for firms recommending persons not employed by them for the course with the idea that they will take up employment management for these firms. In special cases, other men not so recommended have taken the course.

The first course was given at the University of Rochester, New York, beginning March 26, 1918. Courses have since been given at Harvard, Columbia, Pittsburgh, Northwestern University, the University of Washington, and the University of California. The course at the University of California was given from September 3 to October 11, under the direction of Ira B. Cross, associate professor of economics at the University. He was assisted by R. A. Sigsbee, of the Emerson Co. of New York.

SERVICE AND EMPLOYMENT MANAGERS' ASSOCIATION OF CALIFORNIA

Upper row, reading from left to right—W. C. Goodrich, W. A. Lewis, Emergency Fleet Corporation, Clifford Goss, California-Hawaiian Sugar Refining Co., J. K. Carr, Hercules Powder Co., W. L. Roberts, Schaw-Batcher Co., Joseph Fischler, California-Hawaiian Sugar Refining Co., H. R. Johnson, Mountain Copper Co., Ltd., G. H. van Senden, Shell Oil Co., M. L. McDonnell, Oakland Mazda Lamp Co. Middle row—A. E. Bredull, California Cotton Mills, F. J. Mullins, F. E. Booth Co., N. B. Slater, Paraffine Co., Inc., Philip Playter, Celite Products Co., M. C. Burr, Shell Oil Co., R. N. McKinnon, Great Western Electro-Chemical Co., F. M. Ballard, unattached, F. L. Cotton, California Cotton Mills, C. W. Mace, Giant Powder Co. Lower row—P. J. Hayselden, Pacific Coast Shipbuilding Co., W. H. McBryde, Hercules Powder Co., Miss Emma Palmer, Gantner-Mattern Co., Ira B. Cross, instructor in course, Miss Anna C. Clapp, unattached, R. A. Sigsbee, instructor in course, Mrs. Dina McGrath, Metropolitan Laundry Co., C. L. Foster, Union Construction Co., William H. Dunn, unattached.

The members of this class have formed the Service and Employment Managers Association of California, with permanent headquarters at the Palace Hotel, San Francisco. The officers are Warren H. McBryde, president, Clyde L. Foster, vice-president, Will-

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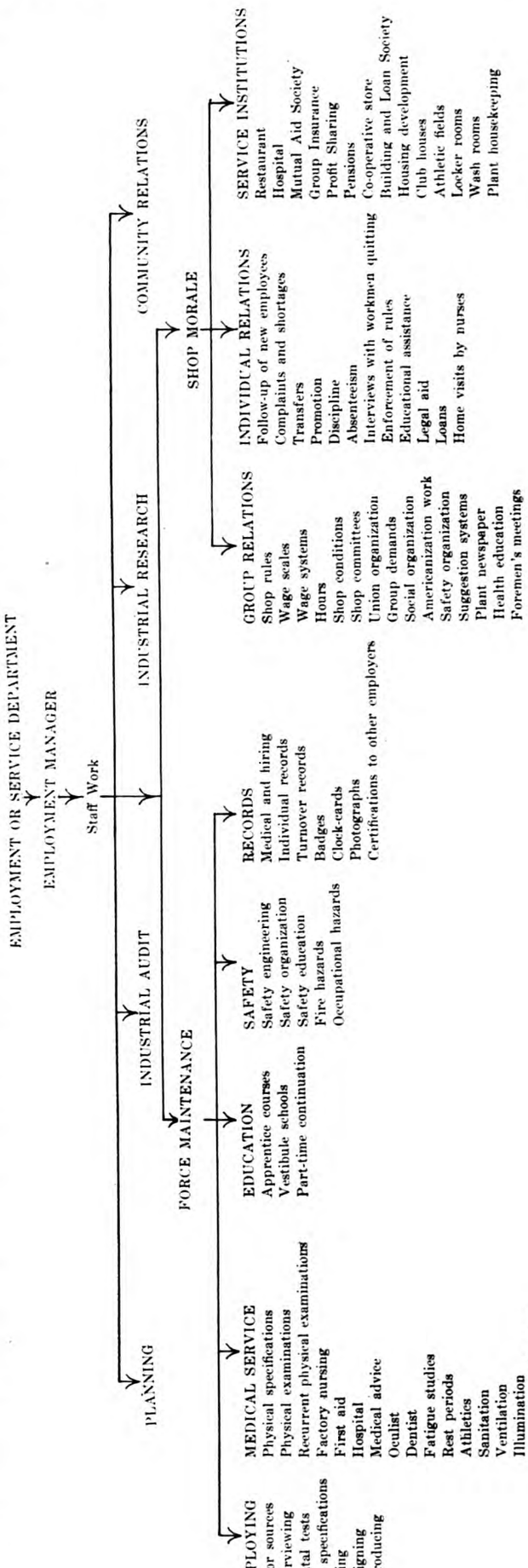
iam H. Dunn, secretary, P. J. Hayselden, treasurer, and Ira B. Cross, advisor. The members of the Association represent approximately 50,000 industrial workers in the San Francisco Bay district, but the Association is in no sense an employer's organization. The employment manager, although paid by the company, is just as likely to disagree with the 'boss' and to have trouble in convincing him of the advantage of some measure favoring the worker, as he is to disagree with the worker in a similar case. In fact, there are some analogies between the relations of the employment manager, the employer, and the employee and those of the engineer, the owner, and the contractor. Perhaps this is one of the reasons why a large proportion of the newly-trained employment managers have had engineering experience.

The objects of the newly-formed association are stated to be "to bridge the gap between the employer and employee, to promote better industrial employment relations, to standardize service and employment practice, to reduce labor turnover, to maintain a library dealing with industrial relations, and to foster a central organization for the promotion of better human industrial relations." Some of the work of an employment manager is tabulated in the accompanying diagram. Of course, few plants would need all these activities, and the owners of some relatively small plants might think that most of the program was too elaborate for their needs, but that would probably be because their point of view is similar to that of the factory-manager in the well-known anecdote. One of his teamsters remarked "Me and that off-horse have both been working for the company for seventeen years." "The company has always treated you well, I suppose," said the manager. "Well," replied the teamster, "last month we was both sick, and they got a veterinary for the horse but docked my time."

The activities of the employment manager differ widely from the old-style 'welfare work', often more correctly described by the workmen as 'hell-fare work'. Welfare work too often carries with it the implication of charity, and no employee that is worth employing wants charity. He wants what is coming to him, and intends to get it.

Welfare work has usually been something that was handed down by the employer out of his great consideration for the lowly workman. If a club-house is built, it is managed by the employer, and the employees have nothing to say. A company 'somewhere in California' maintains a small store where tobacco and similar articles are sold at the regular retail prices. It is announced that all the profits are used in improving the quality of the food at the cafeteria also run by the company, but the workmen, having no voice in the management, and no access to the accounts, are suspicious. The employment manager, on the other hand, seldom starts any new activity until there has been a demand for it from the employees themselves, possibly fostered by himself or his assistants, but nevertheless a bona fide demand. When any new step is taken, it is taken after a conference with the employees, and particularly with their leaders. If the workers are organized, the labor-union leaders are consulted. Frequently, when there is no union, it is



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found advisable to encourage organization of the plant employees, preferably by departments, in order that it may be easier to learn the wishes of the workers. After a new activity, such as a club-house, has been started, the employees have just as much, if not more, to say about the management as the employer.

Perhaps the most important part of the employment manager's work is in 'hiring and firing'. The old system in general was something like this. The only company representative met by the man looking for a job was a much-worried foreman who seldom had either the time or the inclination or, for that matter, the ability to find out just what work the man could do best. If the applicant said he was a blacksmith's helper and looked like a blacksmith's helper to the foreman, and a blacksmith's helper was needed in that department, he got the job. Failing these conditions, he was directly or indirectly told to 'get the h—ll out of here,' although a blacksmith's helper might be needed at that time in another department. Furthermore no attempt would be made to get his address in case a need for a blacksmith's helper came up the next week.

The old-style 'firing' system was even more rudimentary. If a workman should accidentally mash his thumb and then throw a dollar hammer into deep water in a fit of temper, he would, at least, he reprimanded. Yet how many foremen have brought a Monday morning 'hangover' on the job, and taken it out by firing two or three workmen for some trifling blunder, although it may have cost the company over a hundred dollars to train these men?

These are some of the conditions that have contributed to the tremendous labor turnover in most industries, a turnover that was bad enough in times of peace, but in time of war has become a national menace. A writer in a recent number of the 'Saturday Evening Post' says:

"In this pinch for steel you could not imagine 30% of the supply of ingots in a given district drifting about from plant to plant, so the mill manager who went to bed with a well-stocked yard might wake up to find half his supply trundling off to some other mill. Just that happened with labor over and over, and it was as unprofitable to labor as to the employer. It was a sign of gross inefficiency in handling labor thrown into high relief by the War. Imperative war conditions are pointing the ways to correct it."

On the other hand a man looking for a job at a plant where there is an employment manager goes to see a man whose principal concern is obtaining good men for the entire plant. If the employment manager and his assistants are busy, the applicant sits down to wait in a comfortable chair in a comfortable room. When his turn comes the employment manager talks to him with this principle in mind: 'Try to find out what the applicant can do best, and if there is no opening for him in that or any other line, at any rate see that he leaves feeling that he would like to work here.' Furthermore a man is not discharged until it has been demonstrated that there is no work around the plant that he can do.

The employment manager in a plant should rank next to the general manager. While his department is independent of that of the sales manager and the purchasing agent, it is really even more important than either of those departments, since almost any plant has more problems in connection with its labor supply than it has in obtaining materials or selling its products.

The Office Boy's Alibi

The boss blew in at half past nine
Sore headed like a bear.
Before that things were goin' fine
He balled 'em up for fair.

I guess this morning he rolled out
From the wrong side of the bed
Or else his wife nagged him about
Something he did or said.

Our head clerk got a calling down
For things he didn't do.
It made him mad and so Miss Brown
Got called a plenty, too.

She passed the grouch along to me
And got my goat at that.
And so when I came home you see
That's why I kicked the cat.

Some Things That Make it Hard to do Business

A bench in a little coop for the busy business man to wear out his pants on, while waiting to be admitted to 'the presence.'

A little wicket through which he must tell the story of his life and what right he has to live to a haughty stenographer.

A telephone operator who first asks, "Who wants him?" and then, "He just stepped out."

An office boy on sentry duty.

A trick-catch on the gate.

A man who doesn't provide some method by which another business man can get to him and say his say and get away with a minimum of lost time.

The superintendent of one of the departments of the Bethlehem Shipbuilding Corporation is being kidded by his foremen because he was so unfortunate as to break out with the measles. He claims that it is almost as humiliating to get a child's disease as it is to be run over by a Ford. While he was confined to the house, his men sent him a rattle as an expression of their sympathy.

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The Zeebrugge Affair

[Herewith we publish an account of the gallant manner in which the harbor at Zeebrugge, a German submarine base, was blocked last April. The story is told by one of the officers participating in this heroic enterprise. We have added a map, so that the description can be followed easily. It is rendered more interesting by the actual capture of Zeebrugge.—EDITOR.]

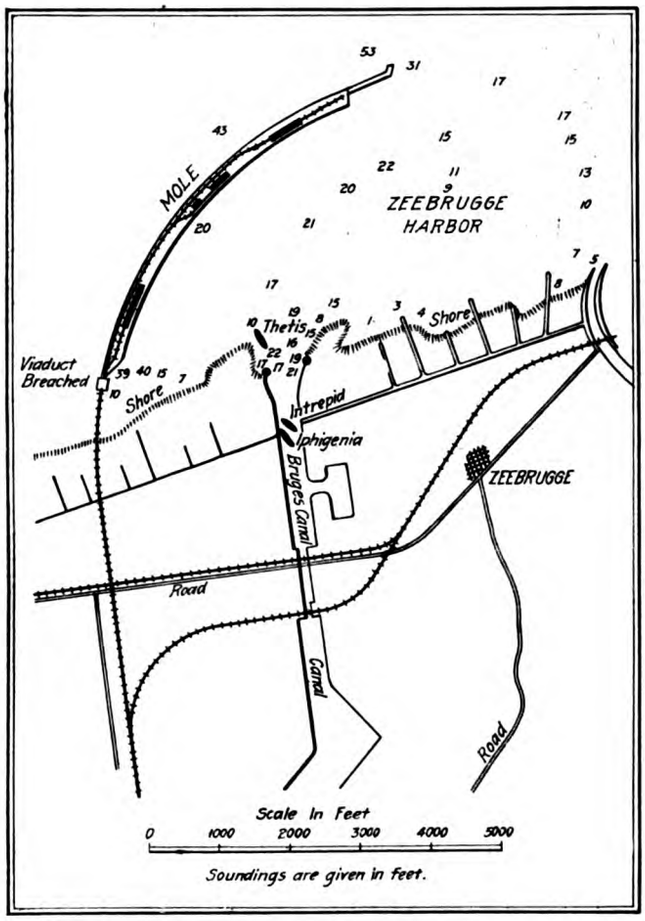
The problem that lay before us was far bigger and greater than the landing on the mole, or any mere spectacular features. It was vastly different from merely sending one or more ships into a harbor protected by shore-batteries, because the channel to be blocked was narrow and a ship or ships must be placed carefully to make the effort successful. Moreover, the waters through which the vessels must dash were under the protection of heavy guns, which commanded the sea practically for 15 miles out from the coast.

This meant that the vessels, with the blocking-ships, must arrange their dash under cover for 15 miles; and then, having run the coast-batteries, they must go close to a heavy battery upon the mole, located about a mile out in the harbor, and able to fire practically point-blank at the attacking vessels. And then, of course, another run of 15 miles had to be made under fire of the near shore-batteries of the mole and the heavier coast-batteries of the mole and the heavier coast-batteries, as well. The German mine-fields also had to be circumvented.

Various elements had to be taken into consideration. Naturally the dash must be made at high tide. There was only one way in which we could hope to protect the vessels if the raid were made in daylight, and that was a smoke-screen. But aeroplanes, scouting above, would lay a fleet open to observation and to the same attack by indirect fires as on land. So the dash had to be made at night, and on such a night as the tide would be high at about midnight, for the ships must go in, do their destruction, and then come out again before the shore-batteries would have the daylight to help them.

There were something like 150 guns on the shore commanding the 15-mile radius. If these discovered the vessels, none of the ships could have lived through the shower of shells. As the batteries all had the use of searchlights and star-shells, it became necessary to take measures to prevent the ships being seen by any method of illumination until the last moment. That necessitated the use of smoke-screens. A smoke-screen is of little use unless it approaches with you; thus you must always have the wind blowing in your direction of advance. In our case it was from the north. The use of any craft to make smoke would not be effective unless it continued up to the coast, making smoke to the last minute. This necessitated light-draft vessels, and then in turn required calm weather.

So the conditions necessary demanded high water occurring at a particular period of the night, wind blowing directly into the harbor, cold weather, and, of course, no fog, for the latter would prevent the blocking-ships from finding the coast. Having attained these, there still were other matters to be worked out. In order that the blocking-ships might find their destination it was quite obvious that they must be able to see for a certain distance, say, for a mile or two, at least. And this means



THE PORT OF ZEEBRUGGE

that the moment the entrance to the canal was in the same area of clear atmosphere with the blocking-ships, namely, during the final run in, the shore-batteries on the coast-line also would be in the clear weather and able to concentrate on the blocking-ships, much to their detriment.

This applied both to Zeebrugge and Ostend, where the German batteries are on the actual coast-line. But at Zeebrugge there was the additional obstruction of the mole. This extends rather more than three-quarters of a mile from the entrance of the canal. The outer end of the mole had been turned into a veritable fortress. The position of the navigable channel leading to the entrance

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was such that the ships were forced to pass close to the batteries on the mole, and it was too much to hope that they would be able to do this and pass inside these batteries and then meet the full blast of the shore-batteries without being sunk before reaching the canal. It therefore became clear that it would be necessary either to destroy or to divert the attention of the mole-batteries before the blocking-ships arrived in the vicinity, and in the latter case to keep them diverted until after the ships had reached their destination.

The German garrison on the mole was believed to consist of about 1000 men. It was decided to storm the mole with special parties immediately prior to the arrival of the blocking-ships. The necessity of holding the mole for a time would also provide opportunity to carry out a certain amount of destructive work on the mole. The possibility of reinforcement coming from the shore and preventing the storming party from attaining its object was to be countered by cutting the mole off from shore by blowing up the railway-viaduct.

The mole is a mile and a half long, and 80 yards wide. On the outer side it is flanked by a wall 30 ft. high. Five feet below the top of this wall is a narrow gangway or parapet running the whole length of the mole, with an iron hand-rail on its inner side. From the parapet there is a 16-ft. drop to the mole proper. The inner side of the mole is fitted to allow ships berthing alongside; whereas it probably was never considered that any ships would wish to berth along the outer side. The ships carrying the storming party could not go along the inner side of the mole without passing close to the mole-batteries, and thereby risking the certainty of being sunk. Therefore it was necessary for these vessels to be secured alongside the parapet of the mole, and for the storm parties to climb over the 30-ft. wall down to the parapet, and thence over the hand-rail and drop 16 ft. to the mole before they could attack the mole-batteries.

The operation went like clock-work. The 'Vindictive,' 'Iris,' and 'Daffodil' advanced alongside the mole in spite of the heavy fire from the mole-batteries. The arrival was at one minute after 12 o'clock at night, April 22-23, and the storm party disembarked on the mole immediately. The 'Daffodil,' pushing the 'Vindicator' alongside the mole, enabled this to be done. Because of the roughness of the sea the 'Iris' had difficulty in securing to the wall, and finally went alongside the 'Vindictive' with the intention of disembarking her men over that ship.

The Germans appear to have been taken completely by surprise. Immediately they heard the approach of the vessels they fired many hundreds of star-shells. But the smoke-screens prevented them from discerning the nature of the attack until too late. An old submarine, fitted with explosives, had run into and secured herself under the viaduct, and had been blown up after the crew had escaped in a small dinghy. This terrific explosion in their rear, the attack of the storm party in their midst, and the general confusion that must have reigned among them, were probably the cause of the Germans not noticing the approach of the blocking-ships. These passed close around the end of the mole and made direct for the canal-entrance. The leading ship, the 'Thetis,' was heavily engaged by the shore-batteries, but, although in a sinking condition, managed to direct the other vessels toward their destination. The 'Thetis' herself struggled on, and finally sank close to the canal entrance and right across the stairway. The 'Intrepid' and the 'Iphegenia' proceeded into the canal-entrance and sank in the positions ordered by blowing out their bottoms by mines especially placed for the purpose. Motor-launches had followed after the three blocking-ships and under terrific fire from almost point-blank range they went around the sunken vessels and took off their crews. This rescue-work was so magnificently carried out that practically none of the crews of the three blocking-ships was lost.

When it was considered that sufficient time had elapsed for the blocking-ships to do their work and for the crews to be rescued, the order was given to the storming parties to retire from the mole. While the 'Vindictive' and her consorts were actually alongside they were comparatively safe from fire except in the case of the upper works, which rose above the mole. The big funnels and masts of the 'Vindictive' had been riddled through and through, and many casualties were caused by flying splinters. As soon as the order to retire was given the storm-parties re-embarked. Some had been killed, several severely wounded, and yet out of about 400 men that had stormed the mole less than a score were left behind, in spite of the 16-ft. climb up the ladders and over the parapet. There must have been many acts of great gallantry to enable men who could not walk to be carried back on board amid heavy fire of the light guns on the mole and shell-fire from the shore-batteries, which had commenced to shell their own mole as soon as they discovered it was in our possession.

It was fully realized that immediately the ships shoved off the mole they would come under the concentrated fire of every battery that could bear. The 'Iris,' on leaving the 'Vindictive,' was severely hit and suffered many casualties, but the 'Vindictive' herself and the 'Daffodil' bore charmed lives. All three ships retired to the northward whilst emitting smoke-clouds to cover their retreat. In addition to the vessels already mentioned, a large number of small craft took part in the operation, and it can safely be said that any failure on the part of a single unit might have prevented the success of the whole expedition. Small motor-boats steamed up and down close to the shore-batteries, treating the latter with utter contempt. Destroyers supported the small craft, bombarded the enemy batteries, and assisted in the rescue-work with equal contempt of danger.

Vice-Admiral Keyes directed the whole operation, which had been prepared under his own supervision, from the 'Warwick,' and did not leave the scene of operations until the last of the blocking-ships' crews had been recovered. The spirit and determination with which he had imbued all his officers and men and his great quality of leadership made success as near a certainty as possibly could be done.

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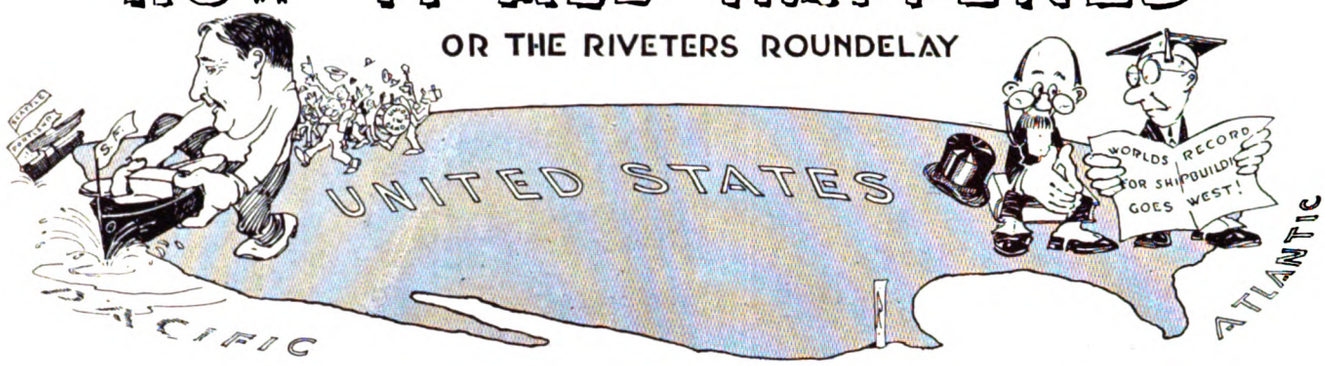
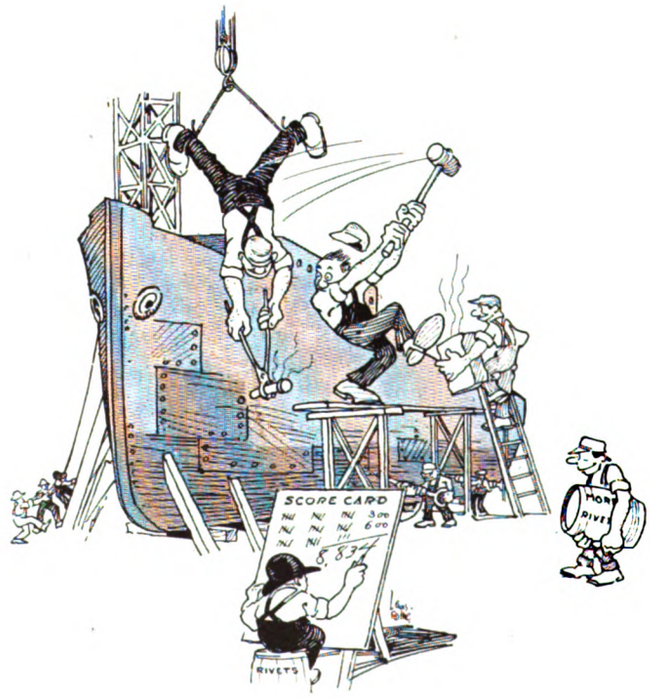
HOW IT ALL HAPPENED

OR THE RIVETERS ROUNDELAY



LYCURGUS ARCHIBALD ALGERNON POTTS,
of Boston and Newport, Atlantic Coast spots,
Said to his side-kicker, Percy McFee,
"By the papers I see,
And it really grieves me,
That the record for shipbuilding, once our proud boast,
Has now been transplanted right out to the Coast.
Portland, Seattle, and gay San Francisco
Won all the prizes, they take the Nabisco."
"Although," he remarked, as he drew himself up,
"For number of ships they have taken the cup,
The riveting record continues to rest
Right here in the East in spite of the West."
Now out in the West is a shipbuilding bunch
That delivers the goods and is there with the punch
The boss of these buckos is one Joseph Tynan,
Who'd rather build ships any day than be dinin'.
'Tis said that his middle name now is "More Ships";
He dreams of 'em,
Schemes of 'em,
And he builds reams of 'em;
And every few days he sends one off the slips.
Now when Tynan heard what dear Algernon said,
You bet he got peeved and began to see red.
He yelled out his thoughts in a voice most decided,
"I'll show those blanked fellows we won't be derided."
He called his lieutenant, Alfred S. Gunn,
And gave him instructions 'bout what he wished done.
"That record can't last,
For bust it we shall,
And do it up fast,
Now you know me, Al."
Gunn went on the run to the riveting boss,
Pat Keenan by name, who was not at a loss
What to do in the pinch to cop off the prize.
Gunn says to him, "Patrick, I know you are wise,
To the ways of all riveters, pick me the best,
And send 'em to bat for the name of the West."
Says Pat, "In the yard, Sir, I've got just the crew;
I taught 'em to rivet, I know what they'll do,
I'll speak to them tenderly, tell them they must
Break that old record, they'll do it or bust."
You know all the rest from the papers you've read,
How Dahl and his gang put the record to bed.
Before they began he said to his crew,
"Just listen to what I'm tellin' to you.
We may not be able to go over seas
And help bring the much despised Boche to his knees,
But we'll do our bit toward strafing the Hun
By giving them Hell with this riveting gun."
Then at it they flew,
Determined to do
More than eight thousand before they were through.
And just as expected when time came to stop
They were thirty-two hundred right over the top.
When the rivets were counted the glorious score
Was eight thousand eight hundred and thirty-four;
And Dahl and the gang could have worked a shift more.
"Fine business," said Tynan when he heard the news,
"This will give Algy a touch of the blues;

He'll have to realize sooner or late,
That the West has the Eastern Coast backed off the slate,
This Coast's there a million, and we have to take
A back seat for no one, I'm right here to state,
Bring out your records on any old thing,
I'll say we'll bust 'em, our hat's in the ring."



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Our Mutual Friends

A Department for Friendly Discussion

Edited by The Business Agent. Address all communications for this department to The Business Agent, 'Metal Trades'

Business Agent,

Metal Trades Magazine,

Dear Sir:

I don't suppose you will print my letter because I aint a going to say the kind of things you would naturally select for good reading for them employers who support your paper. But you can do as you please about that. First of all I want to say what I think of a Business Agent conducting a department like this anyway. But I won't say nothing. What's the idea? Is it to have a little pink-tea talking about shop-kinks, and how to make good, honest, hard-working union men? Maybe it is. Well, here's luck to you on that line of bunk. I aint saying you have sold out or nothing of that kind, but I'm going to be mighty interested in the kind of stuff you stick into the paper. If you are on the square and mean what you says about our being Mutual Friends, there may be a chanct of our getting somewhere. First thing I want to know is What's the idea of this here magazine anyway? Second I want to know what's the idea of this department? When I know these things maybe I can ask you a few questions in this 'friendly' discussion which will test our friendship to the limit. But I want to know the idea first of all.

BILL.

Bill:

Go ahead and shoot! We will be friendly if we can, and if we can't we'll can it. That's fair. Your questions are splendid for a starter. I cannot speak for the management of this Magazine, but I have a few notions of my own concerning this paper and what it is going to mean to you and to me. There has been a great need, here on the Pacific Coast, for a mouth-piece for the metal trades industry, concerning industrial and labor problems. Most of the trouble in this world is caused by things which never happen. Most of the things we get mad about are things we know the least about. Tom Dreier says that getting mad is bad business because it shows our ignorance. He says that if we were wise, we would understand, and if we understood we wouldn't get mad. Employers as well as employees get mighty provoking at times, and it requires a great deal of patience on all sides to keep the belts on the pulleys. Then again, there are fellows who enjoy themselves most when they are all heated up, and mad all over. They pretend not to like it but they do. To some people talking loud and looking mad is their best argument. It works—sometimes. But here in this paper we can't look mad, and the Editor will not permit us to say nasty things about one another. We don't want to anyway. It is hard to be mad at someone you don't know and have never seen. We may differ on many points, but we are going to agree on many more. Our real critics are our real friends. I expect to be criticized by you and many more just like you. If your criticisms are real and to the point you are a good friend of mine. If you can convince me of certain things I shall have a very tender regard for Bill. My idea in editing this department is to educate myself. I am going to learn a lot from you and from many others. I want to get things straight. Do you?

I would take it that you are a good union man? I hope you are, Bill. To be a good union man is to be a good citizen. I do not always agree with what some men consider being a good union man may be, and I expect to discuss that question right here in this paper without reservation. Go ahead and shoot!

THE BUSINESS AGENT.

BUSINESS AGENT, 'Metal Trades'

Dear Sir:

There is a paragraph on the first editorial page of this paper of yours that may mean something to you, but I can't make any sense out of it. It is the first one I mean, the one about Barnum being a resident of Bridgeport. If it isn't asking too much, help a fellow out.

B. V. D.

Dear B. V. D.:

Barnum, if you will remember, was a somewhat famous showman who flourished when you and I were quite small boys. A saying of his for which he became famous was 'The people like to be fooled'.

This naturally leads us to Bridgeport, the home of munitions, and one of the strongholds of a certain element of labor that so far forgot itself a few weeks ago as to refuse to abide by the award of a wage arbitration board, and to go out on strike while their fellow Americans were giving their lives in France for the cause of liberty and justice.

Thereupon, Woodrow Wilson, President of the United States, wrote a letter to those labor leaders that must have burned plumb through their chrome-leather necks into their inner consciences, and held them up before their loyal co-workers, naked and ashamed.

So you see the Bridgeport workers who tried to fool the people as Barnum did were promptly called and were fooled themselves, which is something that is liable to happen to most anybody who tries to cross swords with Woodrow Wilson and the American people. (German, and pro-German papers, please note.)

THE BUSINESS AGENT.

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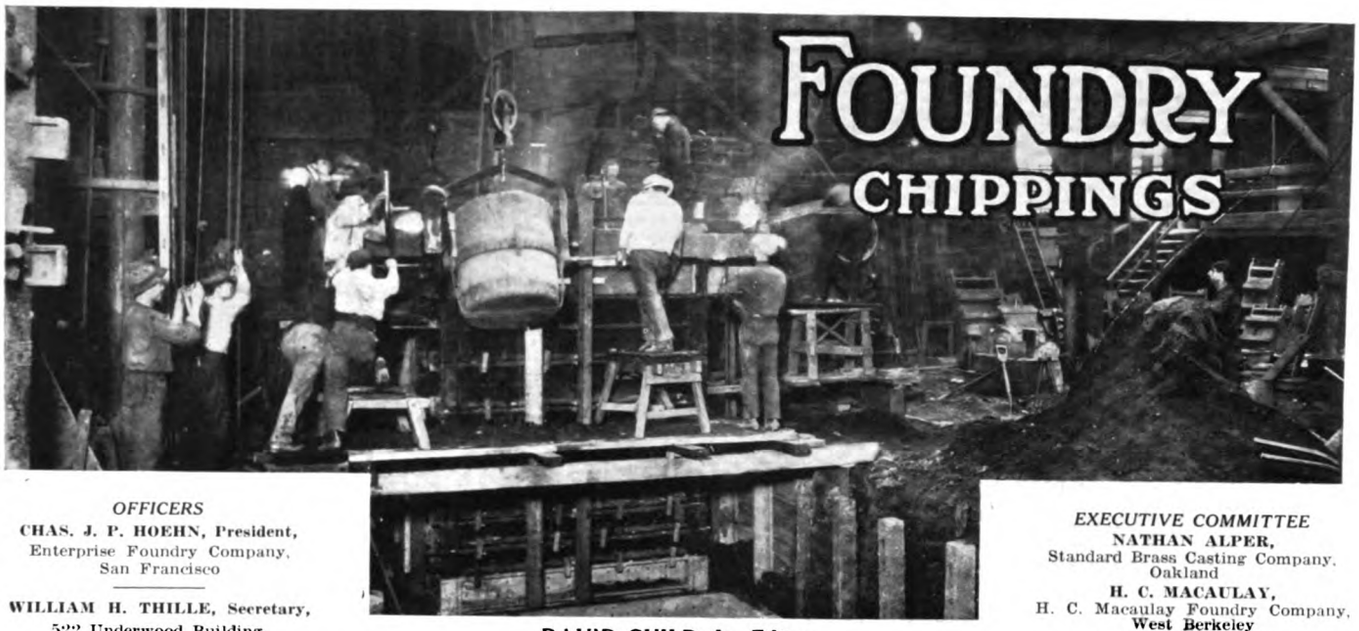

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'Ye Ken at Times a Man Maun Think o' Things'

By JAMES W. KERR

IN the last issue of METAL TRADES, I called attention to the agitation being carried on in connection with Social Health Insurance and suggested that it would be a proper subject for joint discussion, or consideration by the parties most directly interested in the question; namely the employers of our State and the labor leaders, who represent their employees. Social Health Insurance is only one of a series of subjects that will be presented for consideration and for the votes of our people from time to time.

The first of the series was the Workman's Compensation Act, dealing with accidents to employees, this now being in effect and having many commendable features. Social Health Insurance, now under discussion, is the second on the list, and this we are informed will be followed in due time by Unemployment Insurance as a third issue, and more to follow.

The process of advancing this class of legislation follows well-defined lines. There is no preliminary agitation or expression of desire for these legislative acts on the part of those supposed to be benefited by the same. On the contrary, the learned professor is more in evidence in this propaganda than the skilled mechanic, and the interest and sympathy expressed for the employee in discussing these subjects is in marked contrast to the indifferent and I must say hostile attitude shown to his employer.

In the discussions preceding the adoption of the Compensation Act, we heard the employer described as one that sought to make money out of the broken bones, bruised flesh, and streaming blood of his employees.

In the discussion of Industrial Unrest before the Commonwealth Club, Ira B. Cross, professor of economics at the University of California, opened his remarks with the following statement, which I will quote as showing the opinion formed by these learned men of the Californian employer—"The average employer knows nothing of cost accounting, of the costs of running his business, and he knows nothing about the fundamentals of the labor problem. Yet they are the two most important matters to be considered in the conduct of his business—the cost of handling materials, and the problem of handling the labor force. Because of his ignorance of cost accounting, we have innumerable failures, no proper basis for the fixation of prices, and uncertain and unstable conditions in business. Because of his ignorance of the fundamentals of the labor problem, we have strikes, lockouts, industrial unrest, and all the attendant abuses and consequences. The results of his ignorance in both fields seriously affect every class that goes to make up that indefinable something that we loosely call 'the public'."

Employers may not recognize themselves in this garb, but it is well at times 'To see oorsells as ithers see us' and to understand the position in society to which we have been relegated by the learned men of our University.

Those of you whose memories are not impaired may remember two lines in the old copy-books—'Much learning maketh a man mad'—and 'Experience teaches fools.' It will not require much mental effort on the part of the employers, after reading the opinion of the learned professors here quoted, to arrange themselves under their proper classification.

There is a third class referred to in the quotation,

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namely, "the class that goes to make up that indefinable something that we loosely call 'the public'."

This third class, the public, have been hearing much on this question of health insurance from platform speakers, whose form of discussion would suggest that they had graduated under the instructions of the professor to whom your attention has been called.

It is right and proper that the public should be enlightened by these gentlemen, upon the merits of their proposed plans, but it will be unfortunate if employers, who have to carry a large proportion of the burden of these experiments, do not likewise give to the public the benefit of their views. The great voting public should have the whole case before them, before they can form an opinion upon the madness of the learned, or the experience of the fools.

Notwithstanding the lack of capacity that has been charged to the employer, there would appear to be no hesitation in placing upon his shoulders the burden of carrying out these schemes. It is freely stated that the entire cost of these measures will ultimately fall upon the community at large, and that, if it increases the expense account of the employer, this increased cost can be absorbed in the price of his product.

It is true that in times of great business activity such burdens might be assumed by the employer, but they should be avoided if possible. Even if it were possible to pass an act placing serious burdens pertaining to the community upon the shoulders of the employer, it would be well to stop and consider the possible results should we persist in concentrating directly upon our industries, burdens that should be distributed over the entire community. At the present time there is much talk of after-war conditions, and we are urged to reach out for trade in South America, in the Orient, and other sections of the world. We are reminded that we have now the opportunity to develop our shipbuilding and control a large share of the carrying trade of the world. Don't let us forget in this excited hour of rush and battle, that with the dawning of peace, there will be competitors in every field, who will set the pace for us, and who will establish conditions that we must meet. In this period of preparation for the commercial war that is sure to come upon us, what is to be the backing that the State of California is to give its industries. A few years ago legislation was enacted changing conditions in shipping affairs, and a great fleet of steamers, which had sailed from this port for years, went out of existence. I am not raising the question of the nature of this legislation, whether it was good, bad, or indifferent. The point to which I would draw attention is that in placing burdens upon any industry there is a point beyond which you cannot go without reducing the returns to everyone dependent thereon, be he employer or employee, and you may even make it so unattractive to capital that the industry disappears from among us as an industrial factor.

In enlightened communities it has not been unusual to foster the development of industries therein by gifts of land, exemption from taxation, and other means by which the burden of the development of an industry was to some extent assumed by the community. Does San Francisco hope to prosper by adopting a course entirely opposite to this, and lending its support to socialistic experiments at the expense of its struggling industries?

We justly point with pride to the great educational institution across the bay and the opportunities it offers to the thousands who throng its courts, but these things are not sufficient in themselves. A learned community is not always an enlightened community. Among the leaders of the Bolsheviki, who have been so prominent in the eye of the world for the last two years, there were undoubtedly many learned idealists. In Russia they saw many evils that most certainly called for correction; many systems which might be improved upon; but in their enthusiasm they forgot that civilized conditions are not the forced creation of a day, but the result of slow development; and no matter how good their intent, their reckless methods have produced ruin and disaster. In the effort to carry out such social changes as are now proposed we should not shut our eyes to possible results, nor is it wise to hide from the community the cost of the experiment by disguising it as a private tax upon our industries. Let there be no concealment of details as to possible consequences or as to cost.

In this article I have not dwelt upon the merits of Social Insurance in itself, but rather upon the method of its application, to the end that employers and employees in the various industries will adopt a policy for their protection. We should all oppose the proposed legislation.

First; because the unloading of community obligations upon its industries is contrary to the most enlightened practice, and is injurious to all dependent upon these industries.

Second; because in concealing the cost of the experiment or plan the details necessary for intelligent action are withheld from the voter.

Third; because at no time in the history of our State has there been less occasion for such a measure than there is today.

Fourth; because at this time, when our Government is calling for a concentration of effort on the great work it has in hand, it is unwise and unpatriotic to launch a costly experiment, which, at present at least, is non-essential.

Fifth; because in the great economic struggle for the markets of the world which we can expect after the close of this War, it will tend to place the industries of California at a disadvantage.

Men of the Iron Trades, do your own thinking. Do not attach importance to the words of the socialistic idealist because he happens to be a university graduate, nor would it be wise for you to ignore the experience of another, because he happens to be an employer. Listen to both, for your action may mean much, and you must make your choice in this matter between the Madness of the Learned and the Experience of the Fool.

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Convention of American Foundrymen's Association at Milwaukee

THE annual convention of the American Foundrymen's Association as held at Milwaukee, October 7 to 11. Meetings of the Iron and Steel section and the Institute of Metals division of the American Institute of Mining Engineers, and the American Malleable Castings Association were also held at the same time, and there were several joint sessions. In connection with these conventions there was an exhibition of foundry equipment and supplies, machine-tools and accessories, and general metal-working machinery at the Milwaukee auditorium. About two hundred manufacturers were represented.

Among the more important papers presented at the convention of the American Foundrymen's Association were 'Co-operation between the Railroad Administration and the Foundry Industry', by E. D. Brigham, of the U. S. Railroad Administration, 'Women in the Foundry', by C. E. Knoeppel, 'Sale and Distribution of Foundry Pig Iron in War Times', by C. J. Stark, 'Cast Iron in Service-Projectiles and Trench Warfare', by Major Edgar Allen Custer, of the Ordnance Department, and 'Making Steel Castings on the Pacific Coast', by J. D. Fenstermacher of the Columbia Steel Co. The convention program included a number of excursions to the various industrial plants in Milwaukee and the vicinity.

The Pacific Coast was well represented, the following Californians were present: Charles Hoehn, Enterprise Foundry Co.; C. Kelly, Pacific Foundry Co.; A. Haase, Jewell Steel & Malleable Co.; C. M. Henderson, H. C. Macaulay Foundry Co.; J. D. Fenstermacher, Columbia Steel Co.; W. J. Mulcahy, C. C. Kawin Co., and William Llewellyn, Llewellyn Iron Works.

Eastern foundrymen have claimed that good castings could not be made with less than 50% pig, even though Western foundries were using only 25% pig. Now, however, the Easterners have been obliged to accept the larger percentage of scrap and are in some cases making castings out of 100% scrap.

The labor situation in the East is just as serious as it is on the Pacific Coast. There is a scarcity of both skilled and unskilled labor. The wages are not as high around Chicago as in San Francisco. Foundry laborers get $0.40 per hour and molders a minimum of $5.50 for 8 hours and time and a half for over time.

The grade of castings made by jobbing foundries on the Pacific Coast is as good in every way as those made in the East. Many light-work shops are making excellent castings with unskilled labor using molding machines. In the exhibition of foundry equipment were many devices and appliances for cutting costs. However most of these were adapted to the needs of the manufacturer turning out a large number of the same castings rather than to the jobbing foundry. One of the most interesting side-trips of the convention was to the plant that makes what makes Milwaukee famous.

Trade Notes

THERE'S still some scrap in Maine that hasn't started West yet.

A BRASS-FOUNDER across the bay is getting out a metal he calls 'Camouflage Bronze'.

THERE'S nothing makes em jump like when the foreman yells "feedin' iron."

RUNNING a foundry nowadays is 'just as easy' if you wear a mask over your pocketbook.

THAT word 'Questionnaire' comes from the Senegambian dialect 'question' meaning 'hot'.

WHERE'S the inventor that'll work up a scheme to set fire to some of the coke we're getting now.

A GOOD subject for the next Foundrymen's club meeting would be 'Can a foundry be run without cussing.'

SOME foundrymen are afraid if the draft law goes below eighteen-year olds there won't be any inspectors left.

SECRETARY THILLE was presented with a brand new runabout last week, he'll be on the jump now for about twenty years.

THERE was one day last week when there were no reports to make out, and a fellow had a chance to look around his shop.

THERE is an unconfirmed rumor that there is a molder working on the flat who puts up the same day's work he used to put up in 1914.

WE won't hear all about the Milwaukee Convention and the doings of the Californian contingent unless some one of them 'squeals'.

THERE was a fellow in Oakland the other day that said he wasn't working on any Board, Committee, or Commission, but nobody believed him.

FOUNDRYMEN in general could never be called a handsome bunch but since the influenza mask came into use they are postively good looking by comparison.

TIMES have changed. Don't you remember when a fellow jumped for the telephone in hopes it was a customer? Now he jumps away because he fears it is.

A LOS ANGELES foundry has discovered another core-compound. Take some sugar-pine sawdust, add some crushed slag, and season with fish oil until it smells about right, then mix with a steel shovel by the Italian method. This compound won't really hurt a core if plenty of new sand is used with it.—J. E. F.

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Foundrymen's Club of California

THE first meeting of the Foundrymen's Club of California after a vacation of three months was held at Memorial Hall, Odd Fellows building, on Thursday evening, October 10. The meeting was opened on schedule time. The chairman, Charles Straub, of the Pacific Foundry Co., after a few words of welcome, called on the orchestra. The selections rendered were well received and we must congratulate John on the able manner in which he led them. There must have been some tall rehearsing, as they certainly made a hit.

The chairman then introduced E. J. Fowler of the Pacific Foundry Co., who spoke on the club, covering its past, present, and future possibilities, the better feeling that it created, the education that it afforded, the far-reaching publicity it gave the Coast, and the assistance given by the club toward making this section the industrial centre of the West. In the community singing that followed it was noticeable that the members' voices improved and that they are beginning to take to it. That's the spirit. The next on the program was a talk by Mr. Loughead on 'The Aeroplane and Aviation,' discussing its thrills and sensations, its past, its present uses in the world's War, its usefulness in the mail service, and possibilities of the future. D. C. Fessenden, associate editor of METAL TRADES, gave us a few moments of mirth followed by an appeal to the members to co-operate and assist the publication by contributing ideas in the form of good live stuff, that the magazine should be a success and that our industries be well represented.

Core mixtures, particularly substitutes for flour, were next considered. Several members enlightened us regarding the mixtures that are now being used, but it was evident that many others had valuable information, and if prompted, would be able to deliver an interesting talk. However, as they become better acquainted and grasp the spirit, they will begin to come forward. The number of owners in attendance was noticeable and the committee appreciates their presence.

When the meeting adjourned, the members rushed to the next floor where refreshments were served. The members renewed old acquaintances, gathering in groups and chatting of by-gone days, a bottle in one hand, and a St. Bernard in the other. It is safe to bet that the janitor had to turn the lights out on some, for time passes pleasantly yet rapidly when good fellows meet.

BILL.

THESE are the days for labor-saving devices. A few weeks more and only the gentlemen with long whiskers and the girls will be left to run our foundries. The foundries must run automatically. Press the button and away she goes. C. M. Henderson's newly invented core-shooter is along these lines. Built like a machine-gun, you simply turn the crank and it shoots out any size or shape of core wanted. The faster you turn the crank the more cores per minute. Core-makers beware.

Ther's 'Sure Gonna be Some Core'

JOHNNIE had an apple. Jimmie wanted some. Johnnie said, "No." Jimmie pleads for the core. Johnnie settles the matter by saying, "Ain't gonna be no core."

Maybe you have felt that in recent discussions there was "no core," but listen. At the next Club meeting, to be held November 14, there is 'sure gonna be some core.' A special committee has been appointed to gather the 'dope' and they are 'gonna give you the core.' Special stress will be laid on 'Large Marine-Engine Cores and other Cores that can be made from the same Mixtures.'

Oh, you core-makers, Stop, Look, Listen!

But that's not all. The 'Happy Bunch' from Milwaukee, 'the town that made Wet Goods famous,' will give us snappy impressions of the Foundrymen's Convention.

Music? Yes, but with some changes. Come and see if you like them. 'Oh, you songsters,' come with your best voice prepared to warble on some of the popular songs in the few minutes of Community Sing.

Eats? 'Surest thing you know.' Fido, Bowser, and other canine celebrities have promised to be present, and assist in the closing portion of the evenings' enjoyment. Come and 'meat' these 'extinguished' guests. We don't need to mention the rest. You know.

Someone has said "The core-maker is a direct descendant of the ant." When he wants to go somewhere he never goes direct, but wanders in circles, finally reaching his destination. When the core-maker is given a suggestion about some new and better mixture for cores, he never takes it direct, but circles around and around, finally reaching, after a long journey, the ultimate destination, namely, the original suggestion.

N. B. The above obviously applies only to core-makers east of the Mississippi.

N. B.—If there is no meeting held in November on account of the influenza the above program will be given in December.

20-TON BED-PLATE RECENTLY CAST

THERE hasn't been a new core-drill on the market for a week. What's the matter?

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Operation of a Cupola

By William Lauten

THIS article is based on a talk given a few months ago before the Foundrymens' Club. Mr. Lauten is manager of the Coast Foundry Co. and knows whereof he speaks. Recently Mr. Lauten has experimented with column charging with good results, and he recommends that further experiments be made.

A CUPOLA as operated in a foundry is a rapid, easily managed furnace for melting a mass of material. However, it should be remembered that it is a reducing, not a refining furnace, and the material tapped is inferior as to analysis to the material charged. Even if the material charged contains 50% high-class pig-iron, it would not command a better price than ordinary scrap after being tapped. A long metallurgical discussion is unnecessary at this time, but the losses and gains should be explained in order to corroborate the above statement. The silicon of the metal tapped is from 0.18 to 0.28% lower than that of the metal charged, the manganese losses are about 20% of the total charged, and the proportion of sulphur is from 0.03 to 0.05% greater, depending on the coke. The phosphorus remains practically the same.

These figures will vary a little in different furnaces and under varying local conditions, such as blast pressure, fluxes, and fuel, but they are approximately correct. Therefore, if the iron charged contains silicon 1.80%, sulphur 0.07%, phosphorus 0.60%, manganese, 0.75%, the analysis after tapping would show approximately, silicon 1.55%, sulphur 0.11%, phosphorus 0.60%, manganese 0.60%. It is evident that the latter material is not as high-class as the former, in fact it is just plain scrap.

The statement is frequently made that it is impossible to burn iron in a cupola. This is true in part, but you can certainly oxidize a large part of the most important elements that it contains. It is true that the iron will drip away from the melting-zone into the hearth as fast as it melts, but the damage has taken place before it reaches the hearth. You have seen cupolas with small tuyere-areas under heavy blast-pressure produce molten iron rapidly, but bear in mind that the material produced by such a cupola will not compare favorably with that produced in a cupola with large tuyere-areas and reduced blast-pressure. Blast under high pressure will create intense heat, which will melt the iron rapidly, but this intense heat has an oxidizing influence. While it melts hot and rapidly the losses in the furnace are far greater than in one with large tuyere-areas and reduced pressure.

The sand bottom of a cupola is made of the ordinary heap-sand in the shop, but, in order to economize, the melter uses the sand in the drop of the night before. This is screened and dampened to about the same extent as the heap-sand.

The sand is dumped on the drop-doors after they have been elevated and is then 'walked off' and rammed to about the same firmness as a mold. This is then topped with a quantity of shop heap-sand and shaped with a slight fall toward the tap-hole, so that all the iron may be drained. The material from the drop of the night before contains some shot and small cinder, which makes it an open sand. This helps the steam and gases to escape just like a cinder bed in a mold. All large cupolas have perforated drop-doors to allow the steam and gases to escape, since a sand bottom is just as likely to 'boil' as a pig-bed, provideed it is rammed too hard or too wet, or if the gases cannot escape. On the other hand the iron is likely to strain out if the sand is rammed too soft, just as it will strain through the bottom board of a mold.

The fire may be started with shavings and wood, with wood alone, or with an oil torch. If wood is used it must not be placed on end, as the weight of coke charged on top might force some of the sticks into the sand-bed causing a troublesome leak during the heat. If a torch is used, a piece of 1 by 6 in. lumber should be laid on the sand-bed to protect the bed from the torch, and a pipe 4 to 6 in. diam. should be placed in the breast-hole, keeping the end 6 or 8 in. from the brick at the back. The coke is then charged from the platform. The larger lumps should be used on the bed of the cupola whether wood or oil is used for lighting. After the coke is charged to within a hundred pounds or so of the required amount, the pipe is withdrawn from the furnace and the torch placed in the spout, allowing the flame to travel into the aperture made by the pipe. This is allowed to burn until the coke is started. When wood is used light with a piece of waste and oil, or for shavings use a match.

The object of selecting large lumps for the bed is to maintain the bed-height during the heat, since the larger the lumps, the longer they will last. In fact the coke below the tuyere burns slowly, as it is below the blast and is covered a good part of the time with molten iron. Remarkable as it may seem, some of the coke that is first charged on the bed, provided it is of good size in an ordinary heat, will be a part of the coke recovered the next morning.

The height of the tuyeres from the sand-bed is unimportant and varies with shop-conditions. Shops that require a continuous flow of iron have their tuyeres

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rather low, and shops that carry larger taps have their tuyeres higher. The hearth is merely a receiver for holding the molten metal, and the sooner the metal is taken out the better, because liquid iron in contact with a body of incandescent coke will absorb more sulphur than if it is allowed to drain away as it melts. In the average shop this item is offset by the convenience of having the cupola hold the metal until the ladle is returned to the spout.

It requires 30,000 cu. ft. of air, approximately, to give oxygen to burn enough coke to melt a ton of iron. The melting-capacity of a 42-in. cupola is $6\frac{3}{4}$ tons of iron per hour. Therefore you must deliver 30,000 times $6\frac{3}{4}$, or approximately 200,000 cu. ft. of air per hour in order to melt to capacity. If you are melting much more than $6\frac{3}{4}$

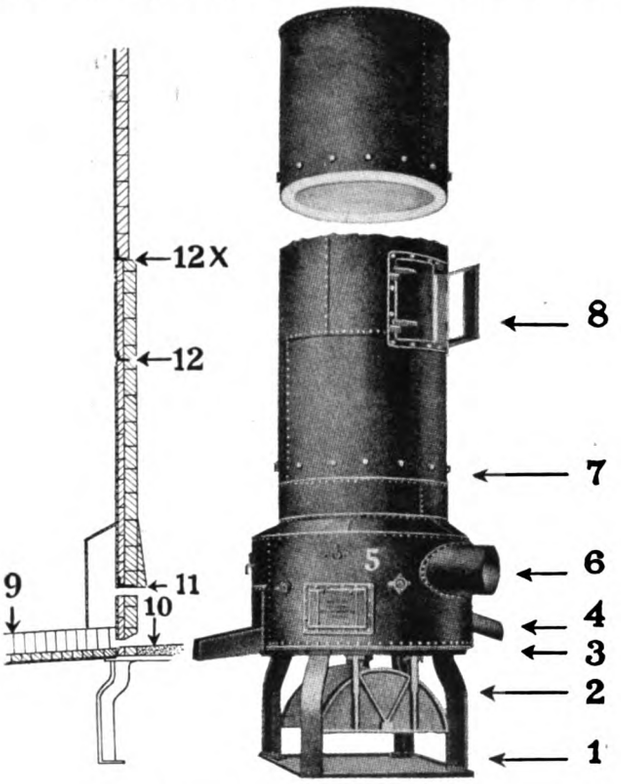

FIG. 1. CUPOLA FURNACE

tons you are charging light material, or else you have too high a blast-pressure. If you are melting much less you are charging heavy material and consequently more coke, or you are not delivering enough air.

It does not really matter how the bed is fired, provided it is at the proper level and burning uniformly when the iron is charged. It is best to save a few shovelfuls of coke to level the bed at the last minute in case it happens to be too high on one side and too low on the other after it has burned through. The coke should be just aglow and leveled at the time the iron is charged. The time for lighting is best determined by the time for putting on the blast, as burning longer than necessary before charging is simply a waste of coke, which has to be replenished before charging in order to bring it up to the required height. The cupola should be charged half an hour or so before the blast is put on, in order to take advantage of the escaping heat. The tuyeres, peeps, and spout should then be closed so as to stop all circulation and unnecessary burning away of the bed. Sometimes this may even be necessary before charging, if the bed burns too freely, in order to 'hooverize' on coke.

The length of time that a cupola should be charged before the blast is put on is an open question. I contend, if the blast is put on immediately after charging and if the first charge is composed of heavy pieces that this requires their being entirely prepared and reduced in the short length of time that the charge remains in the melting-zone, while the charge is allowed to soak half an hour or so, it will then be in about the same condition to receive the blast as the second charge when it in turn enters the melting-zone.

A given weight of coke will yield a given number of heat units, according to the grade, when burned with the proper amount of air, therefore a certain number of pounds of coke will melt a certain number of pounds of iron, other things being equal. The coke on the bed is not so useful for the heat-units it produces as for its work in keeping the charge elevated above the tuyeres. In other words enough coke must be charged on the bed to bring the material to be melted a certain distance above the tuyeres, whether this takes 600 or 750 lb. The way to determine this distance is to measure it with a rod, bent at right angles, allowing one end to rest on the coke and the other on the sill of the door.

You may have noticed the melter plug the spout, on one afternoon, a few minutes after the blast is put on. The next afternoon a much longer time may have been needed. There's a reason. One of the reasons for the irregular heats in the different foundries today, because of lack of co-operation between the foreman and the melter, is as follows: The melter sometimes lights up and charges at the regular time and then gets an order to put on the blast half an hour earlier than the time on the day before. Also in case of hard luck or a rush job that the boss is trying to include with the heat, the melter may receive orders to put on the blast an hour or so later than the day before, although the foreman may not give him these instructions before the furnace is charged. Is it any wonder the iron is hot one day and the cupola 'bungs up' after two or three tons the next day, or even that the iron is cold all through the heat? This difficulty is somewhat aggravated the next day because the melter, poor fellow, not knowing that his bed of coke had burned too low the day before, due to delay in putting on the blast, decides that he did not have enough coke the day before, or that the coke is of poor quality, and therefore puts an extra amount on the bed and an extra amount between charges. The result is that 30 minutes pass before he gets his first tap, and as it takes more time to consume the extra coke between charges, the shop is one hour late on an average heat. The boss and the melter wonder why. If a cupola does a funny 'stunt' some particular night, don't go to the other extreme. There is a reason.

If you will note the shape of a cupola after it has run off an average heat, you will readily see what takes place. The side-walls indicate the melting-zone clearly.

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Now to determine the proper amount to be charged. The bed of coke in a 42-in. cupola will weigh approximately 800 lb. The bed in any modern cupola will melt successfully three times its weight of iron. Many of us, however, charge quite heavy material on the bed, and one must not put too large a burden on the bed. Therefore, if the first material charged is heavy, it is best to reduce the weight of the charge somewhat, so as not to get the bed too low at the start. The main thing to be considered is that the bed-height should not get too small during the heat. The melting-zone proper in the furnace shown in Fig. 1 is about one-fourth the total distance between the tuyeres and the door. If the cupola will take say 8000 lb. to the door after the charge begins to melt freely, the melting-zone will take care of about one-quarter of it at a time, so why not consider letting one charge be handled at a time? In this particular furnace assume a charge of 2000 lb. of iron, which is one-fourth of the iron charged. You may melt successfully with a charge of 500 lb. of iron, or you may melt successfully with a charge of 3000 lb. in the same cupola, but, for the 500-lb. charge there will be four charges going through the melting-zone at one time, and for the 3000-lb. there will be only two-thirds of the charge in the melting-zone. A slight variation either way from the 2000-lb. charge will not be noticeable, but if it is hot enough to melt the brick for one-fourth of the distance, then it is hot enough to melt the iron.

It is customary to charge the pig-iron directly after the coke, not only because it is usually the heaviest part of the charge, but also because pig-iron of the average foundry brand takes longer to melt and requires more heat than scrap of corresponding sizes. To understand the reason for this requires some knowledge of metallurgy and it had best be explained in a later article, but to prove that scrap will melt easier than pig, take a hard piece of scrap, such as sash-weight, or a chilled car-wheel rim, drop it in a ladle alongside of a piece of soft pig-iron and note how much sooner the scrap will disappear.

The scrap should be charged after the pig, care being taken to see that the surface of the charge is fairly level so that it is not all on one side of the furnace. The coke for the next charge is then thrown in, care being taken to have it level. The pig for the second charge follows, and then the scrap for that charge, followed by the coke for the third charge, etc., up to the door.

Should the charges comprise heavy pig and heavy scrap, or if extremely hot metal be required, the amount of coke should be increased, and vice versa, if the scrap is light. If the pig and scrap charged are heavy pieces so that 25% more coke is required to melt it, then it is reasonable to suppose that the rate of melting will be 20% slower, with the cupola running to capacity, as it takes that much longer for the extra amount of coke to be consumed. A 42-in. cupola on an average mixture ought to melt, if running to capacity, about 6¾ tons per hour. The same cupola on lighter material may melt 8 tons per hour, and on heavy material 5¼ tons per hour, and still be doing all that could be expected of it. An extra amount of coke will not make a cupola melt faster, in fact, it will melt slower as the extra coke must be consumed before the charges following enter the melting-zone.

I had occasion to inspect a small cupola that was not melting anywhere near to capacity and found that it had a small tuyere-area, which, surprising as it seems, the melter had reduced purposely with clay to a still smaller area, contending that he needed a more violent blast. The platform was far too low. Large jacketed gas-engine cylinders and irregular-shaped castings were being charged. These were much too large to charge whole in a cupola three times its size. Naturally, they were packed so loosely in the cupola that two charges brought the material to the charging-door. In fact one could have seen the tuyeres had it been possible to approach close enough. Every few minutes the man charging had to free the charge from the wall to let it settle so that the coke below would not be entirely consumed before it had done its work. The platform resembled a sand heap, and the dirt and cinders that were scattered there were being shoveled into the furnace continually. No wonder the furnace was not melting properly, or that their casting losses were high!

PLANT OF ENTERPRISE FOUNDRY CO. AT SOUTH SAN FRANCISCO

Any foreign matter charged into a cupola must be melted, and this requires extra coke. You will find that it is cheaper to cart away the debris from your shop than to use your cupola for an incinerator. Clean coke and clean pig and scrap will give you clean hot iron, if properly melted. They will reduce the defects in your castings, will increase the capacity of your furnace, will give you a better product both in quantity and quality.

Lastly, I must refer to the blast-gauge. It is hard to see what use it is, as it tells only the pressure in the wind-box, and that does not indicate the pressure in the furnace. The compactness of the charge affects the pressure in the wind-box, but if anyone is acquainted with a simple gauge for measuring the volume of air entering the furnace I would be glad to hear of it.

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Bed-Time Tales

IT was midnight and the dark and smoky Foundry was still save for an occasional snore from the night-man, though way off in one corner could be heard a chattering and chuckling, which seemed to be coming from the gagger-bins. I crept quietly down there to hear what they had to say. A great argument was going on. One old fellow all bent with age and almost crazy with the heat was saying,

"You young fellers make me sick, I started in when round ones were good enough, and we were all bent hot too, and now they take a square bar and twist it cold and bend it cold. It looks like a piece of sculpture, it's so crooked it can't lie in the sand straight, and the first time it gets hot it breaks right off. Bah, give 'em to me round and bent hot."

"Well, I don't know, sonny, you aren't so darned old yourself if you are round, when I was made they used to cast 'em all out of cast-iron in gagger-molds, and even if you did break, they melted you up again and made you over, and if you're too long, the molder just breaks you off. That's the way to make a gagger, cast 'em—"

"Ho, Ho," said a voice from the gloom, "I'm older than any of you and there wouldn't be any gaggers if it weren't for me. I leaned up against so many bars I can't count 'em, and I'm easy to make, and if I didn't have the smoking habit I would supplant you all. I'm the soldier and I save sand, also I'm invaluable in proving out a green molder. That's the way the foreman picks 'em out, if he uses lots of me, he's not sure of his lift."

"Oh, I don't know, boys, you all have to come to me, finally," said the can of smooth-on," If the iron sticks to one of you iron guys or hits a soldier, I'm the boy that saves the casting, that is of course if the customer doesn't find it out."

"What's this row all about," said the sack of sea-coal in a throaty voice, "If I wasn't mixed with sand and used to cover you up so you wouldn't melt, where would you be? I'm the boy that does the trick, and I've been at it since Tubal Cain made the first blowhole."

"Say, you guys make me sick, what's the use of pretending your importance when you know you can't even be used if it weren't for the flask. I come in all sizes and styles, wood, iron, steel, snap, floor, three-part, and all-apart. I am the guy who swallows the profits, and I take up more yard-room than the shop. If it weren't for me the boss wouldn't worry. When I am tired and don't fit, my middle name is 'sunabout'."

"Mr. Flask, you are very cocksure, and know it all, but if I, the 'clamp' didn't hold you together, you'd bust with importance and spill all over the floor."

"Yes, Mr. Clamp, but who holds the iron that all your jobs are built for, I guess the ladle has something to say about this—"

Just then a great uproar occurred near the cupola and a chorus of voices chanted—

"Bangety-bang and clattery-clat,
You guys don't know where you're at,
We take the iron and melt it hot,
The stuff you claim is all darn rot."

Just then all of the apparatus started a grand march down the foundry-floor, the cupola leading the blower on his arm, his peep-holes gleaming with delight and his tuyeres red with excitement, the crane followed with the jarring-machine, whose mechanism had just been fixed again, and then they paired off in step, the riddle and the rammer, the bull-ladle and the core-oven. As each passed the sleepy night-man they gave him a gentle kick, he stirred, snorted, and stood erect, all were back in their places, and the night-man reported that an earthquake had occurred at 12.32 a.m. J. E. F.

Meetings

The regular monthly meeting of the California Foundrymen's Association is on the third Thursday of each month at 11 a.m. The next meeting will be Thursday, November 21.

The Ways and Means Committee meets every Wednesday morning at 11 a.m. at the Association Headquarters. It is the desire of the Committee to co-operate with the Foundrymen to the fullest extent. If you have any commercial problems that you feel the Committee may be able to help you solve, or lend you some assistance, you are cordially invited to attend the meetings and present same. Also if you have any suggestions to make, or constructive ideas looking toward the standardization of the foundry industry, PASS THEM ON. It is only through such helpful co-operation that concrete results can be gained.

The Brass Founders of the Bay Cities meet the second Monday evening of each month at 8 p.m., in the Assembly Room of the Association.

The Foundrymen's Club meets on the second Thursday evening of each month at 8 p.m. Notice of the meeting-place will be sent out by the president.

Next Meeting

The regular meeting of the Policy Committee is held on the third Thursday of each month at 8 p.m., in the Association Assembly Hall.

Policy Committee

Charles Straub, President
John F. Kellogg, Secretary

H. C. Macaulay	W. W. Ellis
H. Stern	S. H. Rowland
Wm. Halverson	K. Van Neill

Wanted

By the Policy Committee, new ideas and suggestions that are up to date and snappy. Mail or telephone them to the manager.

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Notable Recent Technical Articles in Abstract

Reclaiming Oil from Metal Turnings. By C. L. Smith. 'The Iron Age,' September 5.

Describes the system used by the Cincinnati Milling Machine Co. Specially-designed receiving-trucks are used to collect the turnings. The trucks are lined with sheet-metal and the sheet covering the sloping bottom is perforated at the lower end to allow the oil drained from the turnings to pass into the tank below. A 4-in. baffle-plate is provided at the front to divert the oil into the receiving-tank. The oil-tank has a sheet-metal sliding top and can be emptied and cleaned easily. There is a sliding door at the front for unloading the chips at the oil-separator. The top of the separator is level with the floor. To collect the chips from the different machines, a galvanized-steel pan is used. This pan is placed on a small shop-truck directly below a sliding door in the oil-pan of the machines. The chips are raked into the collecting-pan without spilling oil on the floor. The collecting-pans are carried on the small trucks to the rear of the shop, where the receiving-truck is stationed. The oil-separators are placed in another building from the main shop. About 100 gal. of oil is recovered per working-day.

Ansaldo Steel Plants Rush Munitions. By Mario De Biasi. 'The Blast Furnace and Steel Plant,' September.

Describes the plants of Gio. Ansaldo & Co., of Genoa, Italy. This company has over 100,000 employees and manufactures a large part of the munitions, machinery, and other supplies used by the Italian army. Most of the raw material comes from the United States.

Plate Production Expedites Shipbuilding. By Alfred M. Staehle. 'The Blast Furnace and Steel Plant,' September.

Rolling-mill capacities have been increased and material saved by the adoption of standard specifications for sizes, etc., of plates. The new Liberty mill of the Carnegie Steel Co. is described. This mill rolls plates up to 100 in. wide and from $\frac{3}{16}$ to 2 in. thick. The output has been from 17,000 to 21,000 tons of plates per month. The mill is electrically driven throughout.

Electric Steel Production for Small Units. By Arthur V. Farr. 'The Blast Furnace and Steel Plant,' September.

Describes the operation of a six-ton Heroult furnace. The particular product made was a high-carbon chrome-steel for ball-bearings. The raw material was mainly boiler-plate and stampings. The total current-consumption was 710 kw.-hr. per ton.

Correct Heat-Treatment of Die-Blocks. By Gustaf Peterson. 'The American Drop Forger,' August.

Steel for die-blocks should have both hardness and strength. Perfect distribution of heat in the furnace during heat-treatment is necessary. Annealing temperatures should not exceed 1550°F. for steel with carbon content under 0.50% or 1500°F. for steel with over 0.50% carbon. If the die-block is of irregular shape, annealing after machining is also advisable. Rules for quenching in both oil and water are given.

The Care and Maintenance of Piston-Rods. By George C. Stebbins. 'The American Drop Forger,' August.

Chrome-nickel steel and chrome-vanadium steel are the best materials for piston-rods for steam-hammers. Each kind of steel must have special treatment. Special packing may be used as a substitute for steel piston-rings and obviates trouble from breakage of rings. The article also describes a central oiling-system for steam-hammers.

Correct Hammer Foundations. By Terrell Croft. 'The American Drop Forger,' August.

The weight of the anvil for a drop-hammer, whenever possible, should be at least 15 times the weight of the hammer. If the weight of the anvil is less than 11 times the weight of the hammer, a timber pedestal on a concrete footing should be used for a foundation. In other cases, a concrete foundation with cushion timbers directly under the anvil may be used. Designs for foundations for single hammers and for a battery of hammers are shown.

Broken Hill Proprietary Company's Iron and Steel Works, Newcastle, Australia. 'Chemical Engineering and Mining Review,' August 5.

This is the largest iron works in Australia. The blast-furnaces have a capacity of 1100 tons per day. At present there are seven 65-ton basic open-hearth furnaces in operation and there is room for seven more. The principal product of the plant is steel rails, but structural steel of all sizes, plates, merchant bar, rods, and steel castings are also made. The ore is obtained from the Iron Knob deposits in South Australia. This ore contains 66 to 68% iron, and there is at least 20,000,000 tons in sight. The phosphorus and sulphur content is unusually low. Limestone is obtained from Melrose, Tasmania, and from a point on the Manning river about 100 miles north of Newcastle. A channel 25 ft. deep has been dredged so that ore, limestone, and other material is delivered from vessels directly to the works. Coal is obtained at Newcastle. Coke is made on the ground, using the Semet-Solvay recuperative by-product process. There are 99 ovens and the output is 450 tons per day. An additional unit of 33 ovens is under construction. Erection of the plant was started in January 1914. Most of the equipment was obtained from the United States. The plant employs about 3000 men, including those engaged in construction work.

Casting Rings in Centrifugal Machine. By E. F. Cone. 'The Iron Age,' October 3.

The De Lavaud process for making piston-rings consists of introducing into a rapidly revolving permanent metal mold, a definite amount of hot metal of proper composition, which is immediately thrown to the outer surface of the mold. The metal cools quickly and assumes its definite shape. Then the ring is removed and annealed, after which the inner rim of the ring is ground on a special machine. The finished product is then so nearly ready for use that little machining is required. The molding machines are arranged so that rings of several different sizes can be cast in the same machine. These rings are denser and have nearly 50% greater tensile strength than the ordinary sand-cast rings. At the plant of the Standard Piston Ring Co., of Trenton, New Jersey, the only commercial plant where this process is used, 18,000 to 20,000 rings are being made per day by a working-force of only 11 men.

Suggestions on Mixing Foundry-Sand. By Robert Grimshaw. 'The Iron Age,' October 3.

Maximum porosity in foundry-sand may be obtained by using sand that has been screened so that all the particles in any one batch are of approximately the same size.

Foundry Industry Makes Big Gain in Two Years. 'The Foundry,' October.

On September 1, 1918, there were 6444 foundries in the United States and Canada, against 6290 two years ago. Gray-iron foundries increased from 4724 to 4787, exclusive

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brass foundries from 1223 to 1280, malleable-iron foundries from 213 to 268, steel foundries from 332 to 426. Brass-foundry departments in other shops, however, decreased from 2224 to 2192. On the Pacific Coast, there were 176 foundries in California, 45 in Oregon, and 89 in Washington. San Francisco has 40 foundries, Seattle 31, and Portland 23. No other city west of Kansas City has as many as 16.

The Motion Picture and Its Relation to Industrial Problems. By Ernest A. Dench. 'The American Machinist.' September 26.

Describes the use of industrial films, first, in educating 'green' salesmen more rapidly than by visiting the factory alone; second, by the use of portable oufits, in assisting salesmen in 'selling a prospect'; and, third, in showing workmen the proper method of performing certain operations. Useful films may often be obtained at a nominal charge from the Bureau of Commercial Economics, at Washington. On account of the cost of showing films being distributed over a larger product, moving-picture films are more useful to the large manufacturer than to the small one. Money can, however, often be saved by hiring a local theatre, rather than purchasing a complete outfit for the plant itself. Slides at local theatres provide a good method of obtaining labor.

Testing the Relative Merits of Casehardening Materials. By Charles N. Underwood. 'The American Machinist,' September 26.

Describes experiments using granulated bone and a mixture of charcoal and potassium ferro-cyanide. The latter mixture gave a greater depth of 'case' after four hours in the furnace, but the bone gave considerably better results at six and eight hours. With neither material was there much increase in the depth of 'case' at eight hours over that observed at six, indicating that six hours is the most economical time for hardening with either material.

Lubrication of Air-Compressors. By W. H. Callahan. 'The American Machinist,' September 26.

The author shows that the temperature of the wall of the water-jacketed cylinder of an air-compressor is considerably lower than that of the air in the cylinder, and it is therefore unnecessary to use a lubricating-oil with a flash-point higher than the air-temperature. By using an oil with a somewhat lower flash-point, carbon deposits may often be avoided.

Report of the Committee on Weights and Measures. 'Journal' of the American Society of Mechanical Engineers. September.

Summary of replies to questionnaire sent to manufacturers that export goods to countries where the metric system is in use. In all, 1445 replies that could be tabulated were received. Of this number, 82% did not use the metric system at all in production, 14% used it only in part and generally in relatively unimportant ways, while only 0.4% used it exclusively. About 38% of the exporters made some use of the metric system in shipping goods to metric countries, but such use was mainly confined to marking shipping-weights on containers and on bills of lading, in order to conform with the local laws, and only 1.6% used the metric system in response to any real commercial need. Not quite half of the exporters found it necessary even to give metric dimensions and weights in their catalogues and correspondence.

Manufacturing Eagles at Ford Shipyard. By Charles Lundberg. 'The Iron Age,' September 19.

These vessels are oil-burning and are driven by steam-turbines. They are 200 ft. long and 25-ft. beam. Twenty-one are under construction at one time and they are to be launched at the rate of one per day. The yard is the River Rouge at Detroit. The well-known Ford manufacturing methods are being applied to ship-construction.

Rehabilitating Cripples at the Ford Plant. By J. E. Mead. 'The Iron Age,' September 26.

In January 1914 the Ford factory established the policy of not refusing work to applicants nor discharging employees on account of physical condition, except those suffering from contagious diseases endangering the health of fellow employees. On November 1, 1917, a census of the plant showed that 6095 employees, or 18% of the total number, were either crippled or physically sub-standard. This employment policy has been carried to the extent of segregating tuberculosis workers in ventilated sheds and giving them light work to do. Of the total number of crippled and other men physically below par, 85% were classed by their foremen as fully efficient, while 15% were unable to turn out as much work as the able-bodied men. Employees sent to the company hospital because of injuries are frequently able, after a few days, to take up light work while still confined to their beds, and this not only enables them to continue earning, but also, in many cases, hastens their recovery.

Commonwealth Ships and Shipbuilding. 'The Commonwealth Engineer,' July.

Gives data regarding the Australian shipbuilding program. In Australia, 49 ships with a tonnage of 233,000 are being built. Of these, 31 are steel and 18 are wooden. In America, 10 steel ships and 4 wooden ships, with a total tonnage of 47,000 are being built.

How a Medium-Sized Plant Solves Its Labor Problems. By H. E. Sloan. 'Machinery,' September.

Experience of the Cushman Chuck Co., of Hartford, Conn. The part played by improved working conditions in reducing labor turnover is mentioned. Piece-rates have never been in force at this factory and a bonus system was abandoned after trial, as it was found that an increased hourly rate was more satisfactory to both sides. In addition, men who have been with the company for some time are paid more for the same class of work than new employees. Among the foreign-born workers, those that are quickest to become naturalized are also usually the best workers, furnishing another argument in favor of Americanization.

Fusion-Welding Fallacies. By S. W. Miller. 'Machinery,' September.

The author shows that the angle of a V-weld should not be less than 90° and that the width of the weld across the top should be at least 2½ times the thickness of the sheet to be welded. A so-called 'ripple' weld, if done by an expert, may give good results in sheets not over ⅛ in. thick, but is not satisfactory in heavier sheets.

What an Industrial Census Can Do. By Dale Wolf. 'Industrial Management,' September.

Describes method adopted by the Miller Lock Co., of Frankford, Pennsylvania, for obtaining information regarding possible sources of labor-supply. This consisted of taking an 'industrial census' of the entire community to determine what persons might, if an opening appeared, be considered for work at the company's factory. By being tactful, the persons taking the census were usually able to get all necessary information without trouble. When positions at the factory became open, letters were sent to the people whom the census showed might be available. Co-operation with the other local factories prevented friction. The cost of obtaining labor in this way was much lower than by any other method.

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INDUSTRIAL EQUIPMENT

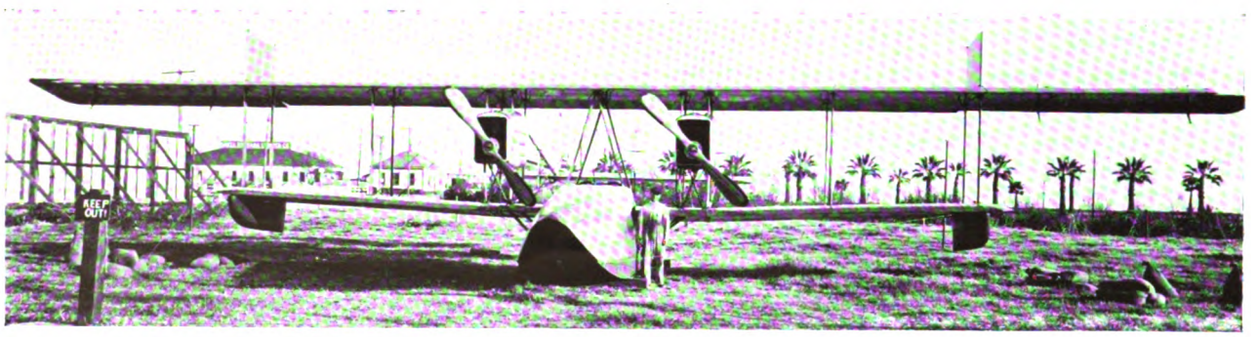
PROPOSED TRANSCONTINENTAL FLIGHT IN LOUGHEAD AEROPLANE

Plans are being made for a flight from Santa Barbara to Washington in a Loughead aeroplane, model F-1-A, with only two stops on the way for gasoline and oil. The aeroplane will carry four passengers, including the pilot and mechanic and a large amount of mail, together with sufficient gasoline and oil for a 12-hour flight. It is estimated that the total running time for the 2800 miles will be about 30 hours. The live load on the machine will be 2522 lb., and total weight 6150 pounds.

Loughead Sea-Plane

The route will follow the main line of the Southern Pacific railroad from Santa Barbara to Maricopa, Arizona, where the first stop for fuel and oil will be made. From Maricopa a nearly straight line will be followed to El Paso, Texas, thence following the Rock Island railroad to a point near Kansas City. A second stop for supplies will be made near Cairo, Illinois, from which point a direct course will be followed to Washington.

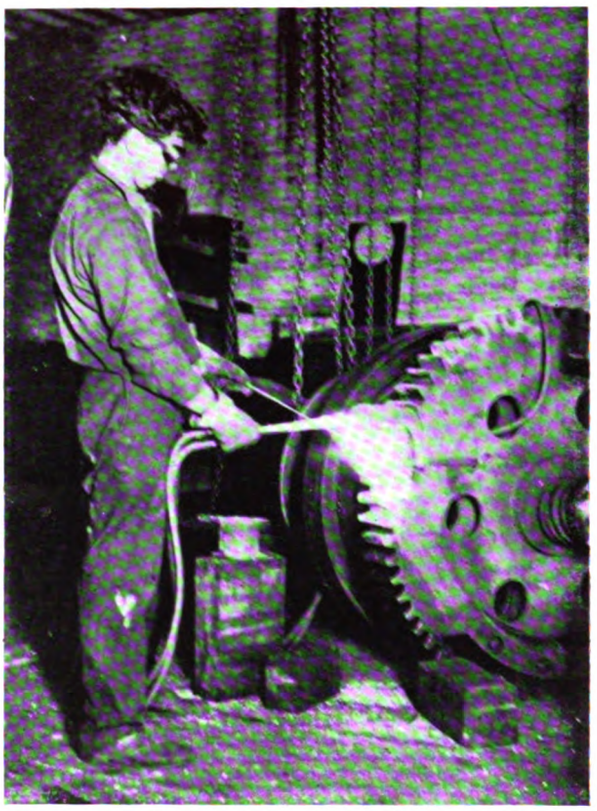
The machine is equipped with twin Hall-Scott engines of the A-5a type, mounted and controlled so that either one may be started or stopped in the air with only a slight correction of the rudders. The maximum speed of the machine is 100 miles per hour and the minimum 45 miles. The A-5a model is a six-cylinder engine developing 160 hp. at 1350 r.p.m. The bore is 5¼ in. and the stroke 7 in. It weighs 595 lb. or 5.75 lb. per horse-power.



Loughead Aeroplane Ready to Start

THE OXY-ACETYLENE TORCH FOR GENERAL REPAIR WORK

Those who are not familiar with the oxy-acetylene torch are surprised at the extent of its application. No welding or cutting seems impossible. Although the most important field for the oxy-acetylene flame is in industrial plants as one of the ordinary processes of manufacture, the most spectacular feature is in connection with salvage or repair jobs. Saving a large steamer from a couple of weeks' delay in port or a power-plant from a long shut-down by a piece of quick repair-work are almost commonplace features of a commercial acetylene-welding shop.



Building Up Broken Gears with the Oxy-Acetylene Torch

Salvaging defective castings is one important use of the welding outfit. This is not a case of concealing the defect but of actual repair. Cracks are welded and holes and

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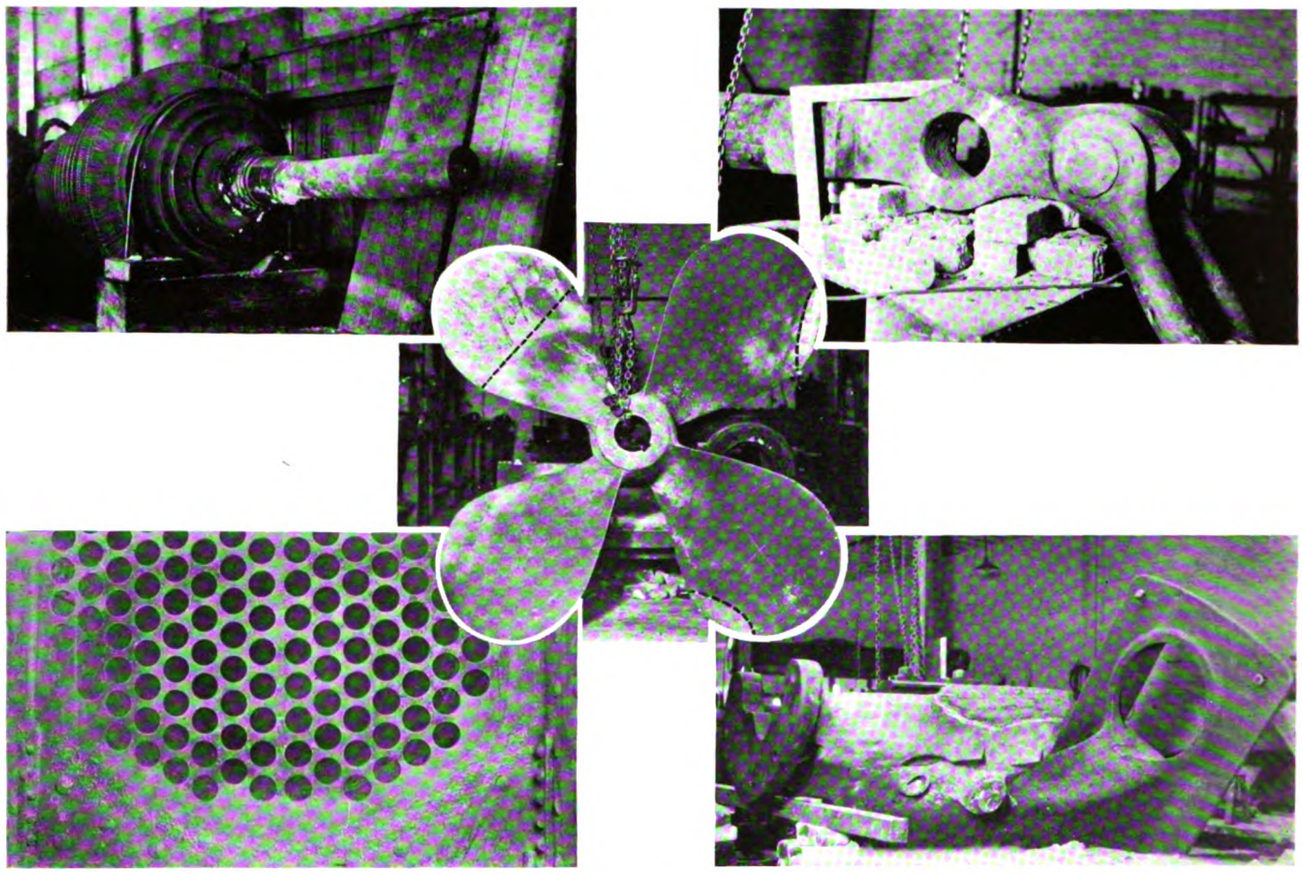


Examples of Oxy-Acetylene Repairs

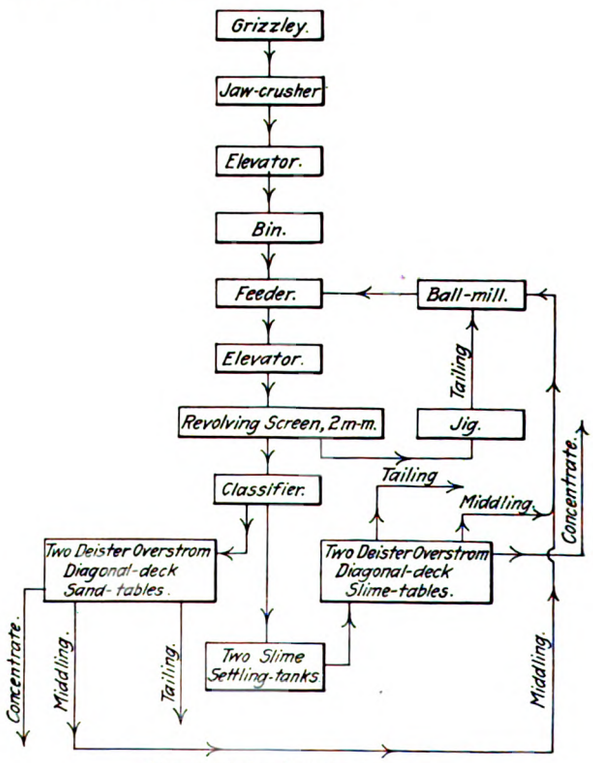
breaks filled with solid metal. In a foundry the saving of castings that would otherwise have to be scraped is enormous. Building-up worn parts is another one of the uses of the torch. Some of the interesting jobs of this kind recently completed in a single commercial shop were as follows: A large brass shaft that had become worn on the end had been built up so that it could be turned to the proper size again. A large dredge-digger which had become worn so that it would not hold the digging-points was repaired by the building-up process at a saving of several hundred dollars. The worn points of a 'wildcat', the apparatus used to wind the anchor-chain, were built up with solid metal and made as good as new.

A large amount of welding work is done on propeller-blades that become pitted and worn through the action of the salt water. The pitted sections at the ends of the blades are cut off and new castings of the proper shape are welded in place. This saves scrapping the whole propeller.

The accompanying photographs, taken at Brown Bros. Welding Works, 223 Main street, San Francisco, show the variety of the work of the commercial welder.

CONCENTRATING TABLES FOR RECLAIMING FOUNDRY RESIDUE

One of the newer uses of concentrating tables is the outgrowth of the greater attention paid by many manufacturers to small operative economies that were neglected before the War. The residual sands and ashes from the operations of brass foundries have a high metallic content. For a good many years, part of this was recovered by rather crude methods of hand-washing. More recently, the ashes have been subjected to a coarse-grinding operation in ball-mills. The coarser particles of metal in both sand and ash have been recovered by means of hydraulic mechanically-operated jigs. With both methods the fine sand and slime was allowed to go to waste although it has been found that they contained a considerable amount of fine metal, which the jigs were not capable of recovering.



Flow-Sheet for Foundry Residue

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Recent practice makes use of concentrating tables to treat this fine material, causing the salvage of a surprisingly large amount of metal which has hitherto been overlooked and allowed to go to waste. We append herewith a diagram, or flow-sheet, which shows a typical operation of this character. The foundry material is dumped on a bar screen or grizzley. That which does not pass through the screen is shoveled into a jaw-crusher. The crushed material joins the screenings, which together go to an elevator, delivering into a storage-bin. This storage-bin is equipped with a mechanical feeder, which delivers to an elevator discharging into a revolving screen having 2-mm. apertures. The screen oversize goes to a two-compartment Harz jig, which removes the coarse material. The waste from the jig goes to a ball-mill, is re-ground, and then goes to the No. 2 elevator. The material from the revolving screen goes to a hydraulic classifier. The overflow from this classifier goes to cone-shaped settling-tanks. The settled pulp is treated on Deister-Overstrom diagonal-deck slime-concentrating tables. The discharge from the classifier goes to Deister-Overstrom diagonal-deck sand-concentrating tables. All tables make concentrate, waste, and middling, the last being fine particles of sand and ash that contain some metal not released. The middling goes to the ball-mill for re-grinding and thence into the circuit again. A plant like this, with a capacity of about 75 tons per 24 hours, requires the attention of only two men.

TRADE NOTES

The Jewell Steel & Malleable Co. is installing an additional annealing oven.

Brown Bros. Welding Co. has added an electric butt-welder and an arc-welding outfit to its equipment.

An open-hearth furnace is being erected at the South San Francisco plant of the **Enterprise Foundry Company.**

The Meese & Gottfried Co. is manufacturing for the U. S. Navy 40,000 sheaves ranging in size from 2 to 18 inches.

The Moore Shipbuilding Co. will start work on a floating drydock in a few days. It will be capable of handling any of the vessels coming to this port.

Two ships a month is the schedule of the **Moore Shipbuilding Co.** Every second Sunday a ship is launched and on the other Sundays a finished ship is turned over to the Government.

The Weidenthal-Gosliner Electric Works have taken the store room on the corner of Mission and New Montgomery streets next to their old quarters. Increased business has made it necessary to get additional floor-space.

The Enterprise Foundry Co. has moved its offices from the second floor to the ground floor of the Southern Pacific building. The new address is 20 Steuart street, San Francisco.

Oscar Krenz Copper & Brass Works has bought the Commercial Iron Works and will use the additional plant in the manufacture of its line of evaparators, vacuum-pans, and similar equipment.

The Stieger & Kerr Foundry Co. is manufacturing a number of charcoal producers for the Government. These machines are used to convert nut shells and fruit pits into charcoal for use in gas-masks. The charcoal from these sources is very porous and has a much greater capacity for absorbing gas than other charcoals.

The California Metal Trades Association has moved from the Southern Pacific building to a fine suite of offices on the second floor of the Rialto building. By the removal of several partitions a large assembly-room 26 by 47 ft. has been obtained. There is a private entrance-hall, a general office, and private offices for the president and secretary.

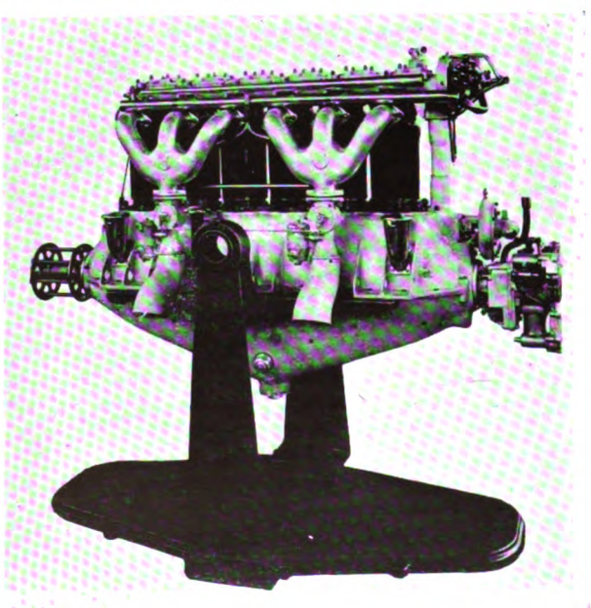
NEW USE FOR SAND-RAMMER

The sand-rammer, heretofore used almost exclusively in foundry work, has been adapted as shown in the illustration to the manufacture of cement pipe. One section of pipe 12

Sand-Rammer Making Cement Pipe

or 14 in. diam. and 24 in. long is completed every 2 minutes. A much dryer concrete can be used with this method and a more compact pipe made. The tool shown in the illustration is an Ingersoll-Rand No. 22 S. R. sand-rammer with a special foot.

The Hall-Scott Motor Car Co. of West Berkeley has perfected a new six-cylinder aeroplane engine that not only



Hall-Scott L-6a Engine

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possesses the superior qualities of the A-5 and A-5a types but also contains new features heretofore unattained in engines of this type. As will be seen from the illustration, the new L-6a engine is of the vertical type with overhead cam-shaft. The cylinders are machined from steel forgings with steel water-jackets welded to them, similar to those used on the Liberty Twelve engine. Not only are the steel cylinders 10 lb. lighter per cylinder than cast-iron cylinders but they will stand a much higher temperature because of the more even expansion. The rated horse-power of the L-6a is 200 or 50 hp. more than the A-5a type. The weight of the engine dry including the carbureter and ignition system is 495 lb. or 2.30 lb. per brake horse-power. The cooling system is of the circulating-pump design and is simple and efficient. Carburetion is secured through two specially designed carbureters with twin manifolds of the hot-spot water-jacketed type. Ignition is obtained with a specially designed Delco unit. The oiling system is of the forced-feed or pressure type, the oil being pumped to the main bearings, from which it is conducted through annular and radial drilled holes in the crank-shaft to the connecting-rod bearings. The crank-cases are of aluminum and the pistons are of a special aluminum alloy. Simplicity and ruggedness characterize the engine together with great power and minimum weight. The Hall-Scott company feels that this engine will meet the need at the present time not only in advanced training machines but also in single combat and scout machines.

Personal

Charles P. Hoehn, of the Enterprise Foundry, has been attending the Foundrymen's convention at Milwaukee.

John H. Hedley of the Western Foundry is quite a violinist, and used to lead the orchestra at the Foundry Foremens' Club.

Charles J. Hendry, Jr., a graduate of the old Union Iron Works, is a Lieutenant in the United States Naval Reserve Force.

R. S. Moore is in Philadelphia on business for the Moore Shipbuilding Co. He is expected back about the middle of November.

James Spiers, Jr., son of the founder of the old Fulton Iron Works, is doing his bit in France as Captain in the Ordnance Department of the United States Army.

William Kingwell, of the Kingwell Brass Works, is considerable of an artist during his off hours, some of his work having received editorial recognition in Metal Trades.

John Llewellyn, of the Llewellyn Iron Works, Los Angeles, knows every speed cop in southern California by his first name. There are no gasolineless Sundays in the south yet.

Joseph J. Tynan, of the Bethlehem Shipbuilding Corporation, likes to play dominos with his son Buster at the Transportation Club, and how Buster chuckles when he manages to beat his Dad.

Joseph P. Baloun, formerly assistant chief draughtsman for the Union Iron Works, and later chief draughtsman for the Pacific Gas & Electric Co., is now chief draughtsman for the Pacific Coast Shipbuilding Co., at Bay Point, California.

Garfield Myers, machinery dealer with offices in the Hearst Bdg., San Francisco, has changed his name to C. A. Garfield. The firm name of Garfield Myers & Co. has been changed to Garfield & Co. There is no change in the personnel of the organization, nor in the construction machinery and equipment.

Denver is becoming interested in shipbuilding, in so far as manufacturing auxiliaries is concerned. A number of iron works in the Rocky Mountain city are busy on War work, and **Frank Shepard** of the Denver Engineering Works and **A. J. T. Reynolds** of the Colorado Iron Works have been in San Francisco recently to enlist their plants in the shipbuilding program.

J. M. Wadsworth, administrative engineer for the Federal Fuel Administration for California, has made the following appointments: **Earl Wagy** and **C. P. Bowie,** advisory engineers on special investigations; **L. H. Cochran,** advisory engineer on power-plant inspection, Los Angeles county; **A. A. Coddington,** advisory engineer on power-plant inspection, San Francisco and Marin counties; **Clyde Swigart,** advisory engineer power-plant inspection, Kern county; **A. G. Caldwell,** advisory engineer hotel and apartment-house heating-plants; **J. C. Martin,** advisory engineer steam railways.

Obituary

David Taylor, for many years foreman of riveters and drillers of the Potrero plant of the Bethlehem Shipbuilding Corporation, died recently of pneumonia.

William Kent died at his summer home in Gananoque, Ontario, on September 18. Mr. Kent was born in Philadelphia in 1851 and was educated at the Central High School of that city, and at Stevens Institute of Technology, from which latter institution he graduated in 1876. From 1877 to 1879 he was editor of the 'American Manufacturer and Iron World,' of Pittsburgh, and from 1876 to 1890 he served as mechanical engineer with several manufacturing concerns. From 1895 to 1903 he was associate editor of 'Engineering News' and for the following five years was dean of the L. C. Smith College of Applied Science, at Syracuse University. From 1910 to 1914 he was editor of 'Industrial Engineering.' While practising as a consulting engineer, he was nevertheless most widely known in the engineering world as the author of 'The Mechanical Engineers' Pocket-Book,' of which nine editions, aggregating more than 100,000 copies, have been printed.

Book Reviews

Steel Shipbuilders' Handbook. By C. W. Cook. Pp. 123, with four plates in insert. Longmans, Green & Co., New York. For sale by 'Mining and Scientific Press', San Francisco. Price, $1.50.

This is a dictionary of several hundred special words and phrases used in the shipbuilding industry. Four plates are included, showing the principal parts of a steel ship. Where any terms given in the body of the book are illustrated in the plates the definition gives a reference to the particular plate. The book will be of great value to those interested in the steel shipbuilding industry, particularly the many thousand that were unacquainted with that industry until a few months ago.

Efficiency in the Use of Oil Fuel. By J. M. Wadsworth. Pp. 82. Ill., index. U. S. Bureau of Mines, Washington, D. C.

In 1917 it is estimated that 40,000,000 bbl. of fuel-oil, or one-fourth of the total amount used, was wasted through inefficient operation of boiler-plants. The present volume is the result of an endeavor by the U. S. Bureau of Mines, acting in co-operation with the U. S. Fuel Administration, to reduce this waste. The author considers the various features of boiler-plant design and operation and points out methods for obtaining efficiency. The text is supplemented by numerous illustrations and tables. The book is of convenient pocket size, and should be in the hands of everyone concerned with boiler-plant operation or design.

FOR SALE

Buckeye Ditching Machine, 28 inch by 12 feet; slightly used, perfect condition. Low price to close estate. Address Opp. 101, Metal Trades.

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